AUGUST, 1957

Commercial Fertilizer

and PLANT FOOD INDUSTRY

Take a good look at your multiwall bag!

Like women's bathing suits, multiwall bags also reveal the passing of time.

Is your bag a vivid, modern example of your business vitality . . . or is it dull, drab and lacking in appeal?

Is your bag the ideal package for your product, in size and construction, or is it a carry-over from the past?

To compete successfully in your markets, your package should be as up-to-date as this issue of the magazine . . . *if it isn't*, it's a good idea to send for us.

KRAFT BAG CORPORATION

Dependable as a service for 3 generations

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Gilman Paper Co.

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KRAFTPACKER
free-flowing material—faster—and with more accuracy, than any open mouth bag filling machine of its type in use today—regardless of price!

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- AMMONIUM SULFATE
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- TRIPLE SUPERPHOSPHATE

You get the assurance of top quality materials from Phillips *66* these four ways:

- **Years of experience and know-how go into each run of Phillips *66* chemical fertilizer materials.**
- **Phillips *66* has a continuing program of research to improve and maintain high standards of quality.**
- **Rigid control from raw materials to finished products insure constant uniformity.**
- **Extreme care in loading and shipping in clean cars assure you of high purity on delivery.**

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With minimum manpower and from cheap raw materials they will produce their own sulphuric and phosphoric acids. They will turn out granulated product of a uniformity previously unknown to mass fertilizer production—through 8 and on 10-mesh screen.

You will be able to offer your present trade or open up new territories with a premium product in such grades as, for example: 16-20-0; 14-14-14; 13-39-0; 6-24-24; 11-48-0.

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and PLANT FOOD INDUSTRY

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Commenting Freely

by Bruce Moran

I'm not given to forecasting, not owning a crystal ball in working order, but it does seem as though the fertilizer industry were getting back to normal. Surplus goods have been trimmed some. Prices of farm commodities seem to have hit bottom. The fertilizer manufacturer and his sources of supply seem to be more confident, more willing to anticipate.

The season was not a bad one until too much water hit two of our major crop areas. It was on a par with last year, which was not too good and not too bad. So if weather conditions favor the farmer, and as the overhanging surplus is reduced, and as the farmer learns better how to get along with smaller acreage and more plant food . . . we may expect stability of the sort to which the fertilizer industry has become accustomed.

over ¼ million tons have switched

Round-the-clock production at Bonnie takes the push out of peak-season demands. Mammoth off-season storage capacity swallows up the seven-day-a-week production, stores it safely until you need it. And the industry's finest delivery schedules assure you high-quality triple when you need it.

International's natural curing helps you cut costs

• It's the natural curing process that gives you that "something-extra" quality of the triple super from Bonnie.

It helps you cut costs . . . gives you better control of manufacturing conditions and chemical reactions . . . stabilizes your formulation problems . . . and reduces the delivered unit cost of (P_2O_5). Here's what natural curing means to you:

Uniform particle size . . . for dependable ammoniation results.

Finer texture . . . for more complete ammoniation in every batch.

Stabilized product . . . for better chemical control.

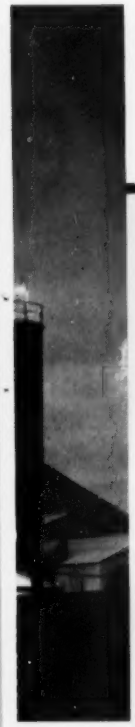
Constant high analysis . . . with guaranteed minimum of 46% A.P.A.

Uniform high quality . . . for increased (P_2O_5) availability.

To guarantee this top quality triple from a plant as large as Bonnie required extra planning in plant design . . . extra capacity for a dependable supply . . . extra time to complete the five-week natural curing process . . . and extra care and quality control to assure uniform results in batch after batch.

This is the way Bonnie was built. And the results of the past year have proved Bonnie can deliver . . . Bonnie is dependable . . . and Bonnie can produce the kind of triple you want.

# of Triple Super Sales to Bonnie



The reason: | *trustworthy service and delivery plus superior results with International's natural-cured triple*

Here's why, in the actual words of Bonnie customers:*

Others have recommended you

"Several nitrogen producers have recommended your product to us because of its excellent ammoniation. They were right."

Missouri

You live up to delivery promises

"What we like about doing business with International is your service, particularly regarding delivery. Our material has always been shipped when requested."

Indiana

Your triple stores better

"Last September, we stored some of your triple next to competitive materials from two other suppliers. Six months later, the other two piles were set up hard enough to be blasted. Any lumps in your product could be broken with your fingers."

Minnesota

Your triple is a better product

"This is the best triple we have ever used for ammoniation."

Ontario

We get better ammoniation results

"We can put 600 lbs. of Urana 10 in with 1,400 lbs. of triple."

New York

Your Triple holds more nitrogen

"We have been amazed with the results. With a very high humidity we have been using 500 lbs. of nitrogen solution with 1,400 lbs. of your triple. Never before have we been able to get over 360 lbs. of this solution in the mix."

Maine

We save money with your triple

"We like the constant high analysis of your product. It aids us in formulation and reduces the unit delivered cost."

North Dakota

You meet delivery schedules

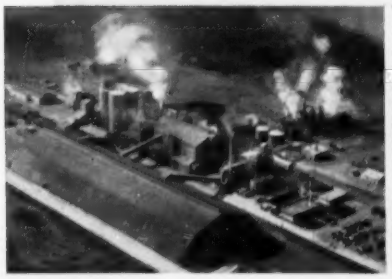
"We certainly appreciate the way International came through on schedule during the rush season."

Arkansas

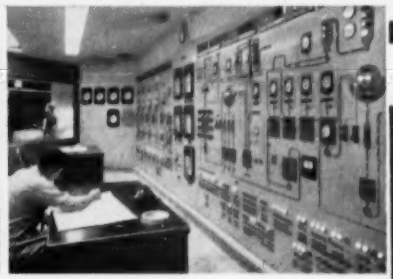
**names on request*

These are just a few of the reasons why this year, the big switch in triple super sales is to Bonnie — giant production facilities . . . prompt delivery . . . superior quality . . . and outstanding ammoniation results.

So this year, for a better product, and service you can depend upon, look to International Minerals & Chemical Corporation. You'll be glad you did.



This 85,000-ton curing unit — as big as two, full-sized football fields — is one example of the time and big capacity needed to produce natural-cured triple.



These "doodads" and dials get results . . . guard the uniformity and quality of every batch of triple super from Bonnie . . . help assure you of top results in ammoniation.

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. . . Blue Valley engineers are constantly working under actual operating conditions to provide the lowest formulation costs for their customers by using the lowest cost raw materials economicaly possible, and by incorporating new raw materials and processes as they are developed and perfected.

. . . Blue Valley offers economy! Blue Valley Granulation units cost less to buy and install . . . and they cost less to operate.

. . . Also, the installation of Blue Valley Granulation units does not require a major equipment change. They can be installed behind either batch mixing or continuous ammoniation. Double screening provided to meet your requirements with a minimum of recycle.

Blue Valley offers heavy, dependable equipment for efficient operation, and with practical, visual control of the granulation process. Don't hesitate . . . investigate today!

Sales grow better, too, on Versenol Iron Chelate

Many of your fertilizer customers already know the green, growing difference Versenol® Iron Chelate makes. They've discovered it themselves, by mixing Versenol with their regular fertilizers.

Now you can put your specialty fertilizers on a preferred basis with these customers . . . by including Versenol right in your formula.

Just small amounts of Versenol can build a big preference for your brand with citrus growers, truck gardeners, nurserymen, commercial flower growers and home gardeners. Customers are quick to notice how Versenol helps plants turn and stay a healthy, rich green . . . improves growth . . . enhances bloom.

It's simple to give your customers the extra convenience of having this extra iron for new growing power right in their fertilizer. Dow will be glad to show you how easily you can include Versenol Iron Chelate in liquid fertilizers, how you can mix Versenol Iron Chelate on Vermiculite with dry fertilizers. Get latest literature and complete information by writing to: THE DOW CHEMICAL COMPANY, Agricultural Chemical Sales Dept., Midland, Michigan.

YOU CAN DEPEND ON DOW

JUST AROUND THE CORNER *by Vernon Mount*

POLITICAL MURDER among the upper echelons of the Russian regime may be a sign of peaceful intent, but if that were so there are doubtless democratic means, even in the USSR. So while we are making all possible gestures of peace and friendship, we are "walking soft but carrying a big stick" as Teddy Roosevelt used to say.

NO CUTOFF of armament is imminent or likely. There are realignments that may hit, for example, some of the airplane plants as we shift to long-range missiles. But the airplane people know this, have anticipated it, are making missiles themselves. So the broad economic picture will not be affected. We are having a good year. WE SHOULD have a good year in 1958.

Yours faithfully,

Vernon Mount

The A.A.C. Co. Plant at Carteret, New Jersey

Another source of AA quality products

To meet your "quick" or "long term" requirements for a variety of chemicals, depend on the A.A.C. Co. You can count on uniform quality and guaranteed purity through rigid laboratory control. You'll get expert assistance from skilled research people in developing "specials" for unusual projects. And you can count on prompt service.

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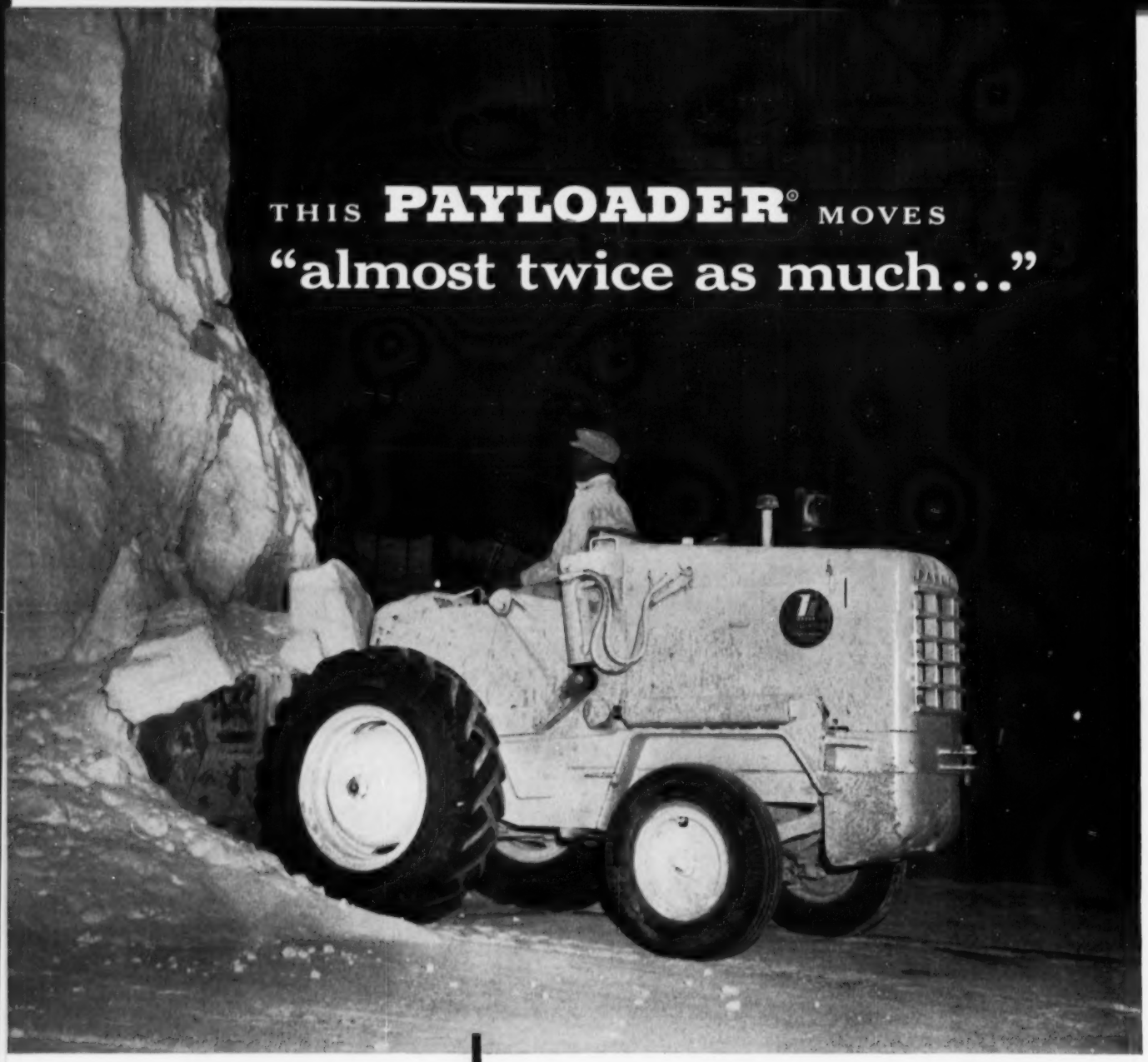

MODEL HAH "PAYLOADER" gives you:

- Short turning radius (9'-10")
- High dumping height (8'-10")
- Large capacity (3,000 lbs. carry cap.)
- Hydraulic load-shock-absorber
- 45° bucket tip-back at ground level
- Power steering, power-transfer differential

"We get almost twice as much material moved with one HAH 'PAYLOADER' as we did with two smaller units," says W. A. Stone, plant superintendent for Wilson & Toomer Fertilizer Co., Jacksonville, Florida. He also states that this new, bigger tractor-shovel is the ***"ideal size for our particular application"*** . . . handling nitrate of soda in a bagging operation. The net result is that Mr. Stone now moves more material at less man-hour cost; he cut his labor costs and fuel bills in half and has a smaller total machine investment with the new HAH "PAYLOADER".

IT WILL PAY YOU TO CHECK the outstanding "work features" listed in the column on the left to see how a Model HAH "PAYLOADER" can help cut handling and operating costs in your plant. There are five other "PAYLOADER" sizes (up to 9,000 lb. carry capacity) to fit all your material handling needs and a nearby Distributor ready to demonstrate ***on your work.*** Call him or write us today.

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Send data on "PAYLOADER" tractor-shovels.

☐ Model HAH ☐ Larger models

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grow quality with POTASH!

You name the row crop—and you'll find that it grows better, produces more, brings higher prices, when it is supplied with plenty of *available* Potash.

Nature can go only so far in providing vitally needed Potash. Fast-growing, high-producing crops can easily exhaust the available soil supply—and then it's up to you. That's why it's good business to be sure your fertilizer program includes plenty of POTASH—either in your mixed fertilizers or as a supplemental application.

American Potash & Chemical Corporation is a basic supplier of Potash. Consult your fertilizer dealer today and be sure to specify plenty of TRONA® POTASH, *the vitally needed plant food.*

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Producers of: BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES • PERCHLORATES • MANGANESE DIOXIDE • *and a diversified line of specialized agricultural and refrigerant chemicals.*

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Let the man from Sohio show you how to cut formulation costs

THERE'S many a way to skin a cat — solve your formulation problems — *and cut costs* — when you have Sohiogen solutions to back you up.

In many cases, a simple change in materials . . . rate of ammoniation . . . or chemical and physical characteristics can make differences in formulation results and cost of manufacture.

The complete line of Sohiogen nitrogen solutions offers greater flexibility of formulation. No other nitrogen producer offers a more complete line.

What's more, the man from Sohio is trained to help you in your selection. He knows formulation problems. And, he's prepared to work out advantages of shipping and handling . . . or show you ways to use Sohiogen's increased flexibility to greatest cost-cutting advantage.

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SOHIO

SOHIO CHEMICAL COMPANY

P. O. BOX 628

FT. AMANDA RD. • LIMA, OHIO

Thiokol®

"Thiokol" synthetic rubber, is an organic polysulfide elastomer. One of its many uses is in solid propellents for long range and high altitude missiles. In liquid form, "Thiokol" synthetic rubber mixed with an oxidizer, is poured into specially designed combustion chambers of rockets. It helps to give stability to the fuel charge and resistance to shock. It promotes uniform burning. When the rocket motor is ignited the mixture burns with great intensity and generates large volumes of gas to propel the rocket.

Solid propellents made with "Thiokol" synthetic rubber have proved their value in rockets over liquid propellents in many ways: they are less costly and easier to manufacture—simple and rugged construction makes handling and launching easier and safer—fuel tanks and complicated feed systems are eliminated.

"Thiokol" synthetic rubber is a product containing a high percentage of Sulphur—its name being derived from the Greek words for sulphur and glue. Here is another example of the continually broadening field in which Sulphur is an important and necessary element.

®A trade name of Thiokol Chemical Corporation.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

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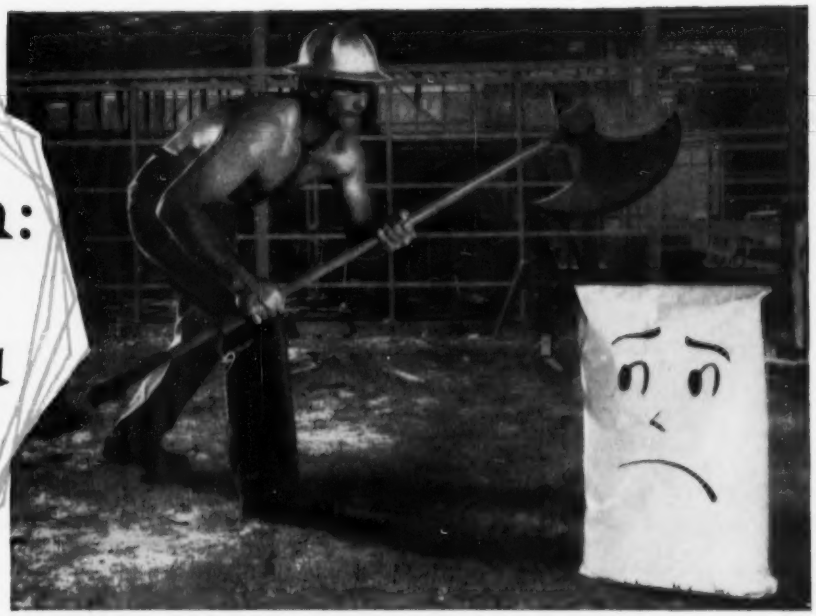
"Freeing" imprisoned products



It's no easy job to open and empty ordinary paper bags that contain chemicals and rock products such as cement. Hard-to-open bags consume time . . . multiply handling costs . . . and retain a wasteful residue of the product after emptying.

Fulton's Solution:

Bags that zip open in an instant

Ful-Zip® multiwall paper bags—with built in rip-cords—zip open like a pack of cigarettes. These bags can be turned inside out for complete emptying . . . reduce labor time . . . and cost only a fraction more than regular bags.

For your packaging or protection problem . . .
Let our Special Services Division show how Fulton products can answer your requirements. We manufacture a complete line of multiwall paper and textile bags, industrial fabrics and made-up textile items. Write: 1418 Annunciation Street, New Orleans, La.

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BAG & COTTON MILLS

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Random NOTES & QUOTES

Fewer and larger is the story of American farms, as the need for mechanization and better administration has its effect. This is ably told in the June issue of "Harvester," International Harvester's fine magazine. Here they devote many pages to a description of Virgil Simpson's farm in Illinois. A pungent quote, which sums up why there are fewer and larger farms these days is from Mr. Simpson himself: 'We have a good State's Attorney here. He's done a lot to get rid of slot machines around the county. But if he really wants to see gambling, he ought to come out to the farm."

O

"The only way we can stay in grain farming today is to increase yields" says a North Dakota farmer. His dealer says fertilizer sales out there are up 200% in the last year. Farmers who never used fertilizer before are buying. They're trying to raise as many bushels as possible on wheat acres limited by government controls.

All of which leads to greater and greater realization by farmers that fertilizer is a good investment.

O

Compromise is offered by the National Grange with other groups "provided the price to farmers, in terms of income and freedom of enterprise, is not jeopardized." Herschel Newsom, national master, raises the question as to whether rural America can afford the luxury of a difference of opinion.

O

The farmer's waning voice in Washington is deplored by sixty leading farm editors who recently met under the aegis of Marsteller, Rickard, Gebhardt and Reed, advertising agency. They agree there is no real farm bloc in the voting public.

O

Liquid fertilizers make up a third of the N sold now in Oregon, where five years ago neither aqua nor anhydrous entered the farm picture there at all, according to the State Department of Agriculture.

O

Ammonium nitrate is being used to blast in road construction, according to an item we saw in a West Virginia paper the other day. This is one sample of research that began right after the Texas City catastrophe, and has led to use of the fertilizer chemical in strip-mining.

O

Thimbles hold the garden that grows in Brooklyn. A retired gentleman there literally plants in thimbles, which he waters with an eye-dropper. Better look out, Sir, that no trace of gibberellin remains in that dropper, or you'll bust your thimbles wide open.

O

Algae, which is one of the oldest forms of plant life, and one of the oldest enemies of water systems, swimming pools and such, now turns out to have such potential as a sort of catalyst for making fertilizer out of sewage that Dr. George W. Reid is growing the stuff. This is naturally, on a pilot scale at present—but he feels he can show commercial value, and get into algae farming!

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 8

Crops need the SULPHUR in Ammoniated Superphosphate

MANY SOILS NEAR DANGER POINT OF SULPHUR DEFICIENCY

Analysis of the minerals in crop plants has always been useful in determining plant food needs. When scientists discovered that barely one fourth of the sulphur in a crop plant was recovered in the ash, they began to realize the vital importance of sulphur as a plant food.

Crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Yet the average soil contains only half as much sulphur as phosphorus.

With the increase in use of sulphur-deficient triple superphosphate and ammonium phosphate in concentrated fertilizers, much land gets little sulphur. This secondary plant food element is more and more apt to limit crop yields and profits. Soils in the Southeast, the Pacific coast, the Intermountain areas, and in the northern Midwest have already shown signs of sulphur deficiency.

Rich Source of Sulphur

But the fertilizers you make with ammoniated superphosphate are a rich source of sulphur. Normal superphosphate contains more sulphur and more calcium than phosphorus. Since you charge your customers only for the guaranteed nitrogen, phosphoric acid and potash in mixed fertilizer, you are giving a bonus in calcium and sulphur for the mere cost of transportation.

Sulphur leaches out of the soil almost as fast as potash or calcium, and it needs to be applied frequently. In an analysis of drainage water in the James river in Virginia, sulphuric acid made up 5¼% of the solids in the river water, while there was only a trace of phosphoric acid. A similar test of the Pecos river in Texas showed 44% of the solids in the water was sulphuric acid, and only a trace was phosphoric acid. A little sulphur comes back to the land in rain, in coal and oil burning or smelting areas. This amounts to only 5 to 30 pounds per acre.

Sulphur Increases Yields

Legumes, grass, cotton, tobacco, corn, and all plants in the cabbage, onion and mustard families require considerable sulphur for high yields. Sulphur also is needed for good nodule formation on legume roots. Symptoms of sulphur deficiency appear in many crops as pale green leaves, not to be confused with the drying up of older, lower leaves, typical in nitrogen deficiency.

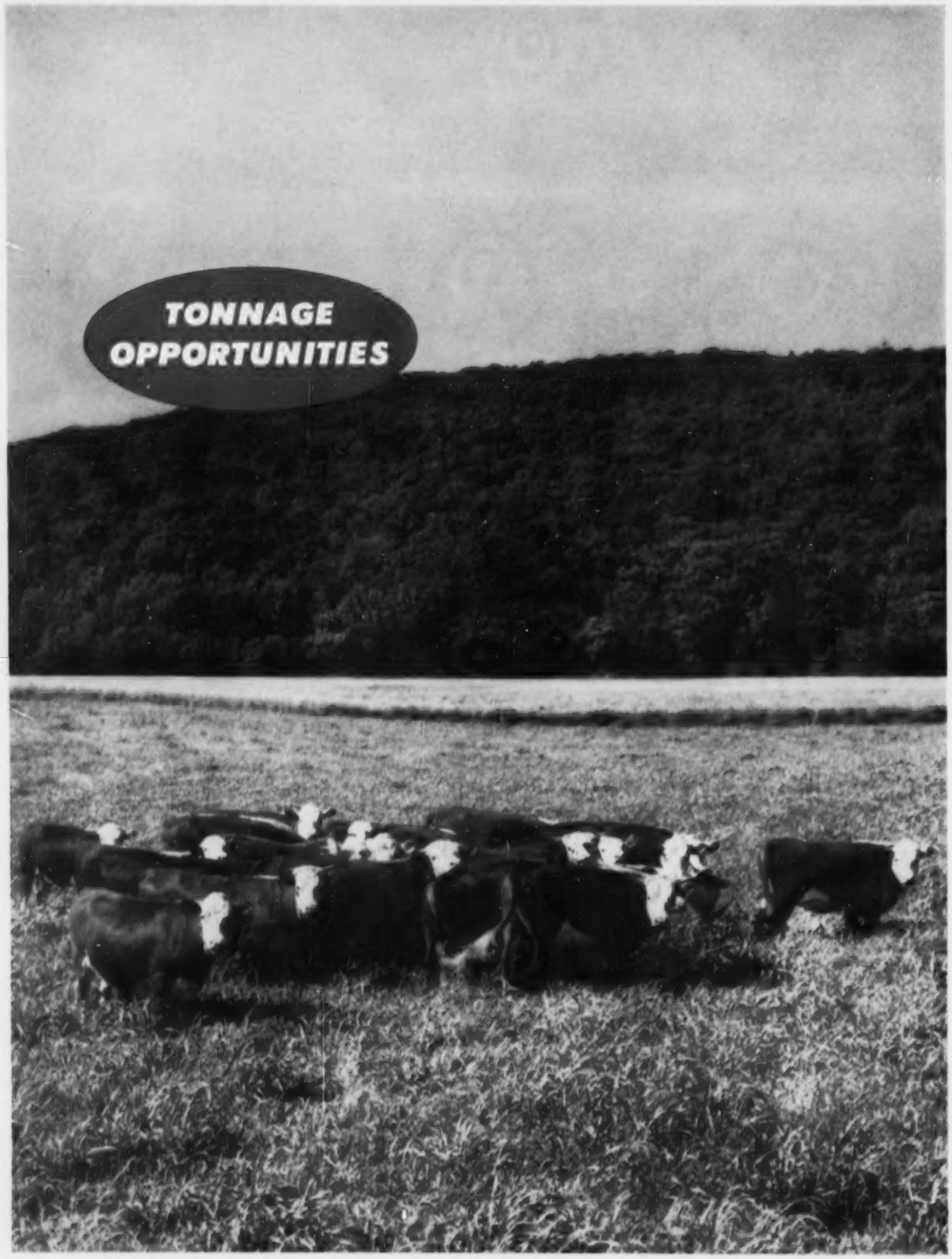
With cotton, lack of sulphur reduces yield of seed cotton, number of bolls matured and rate of growth. In 12 Alabama tests on a wide range of soils, cotton response to sulphur showed an average increase of 161 pounds of seed cotton per acre.

In a three-year test on typical Southeastern soils, white clover produced poor yields when sulphur was omitted from the fertilizer. In an alfalfa test, yield was 1 ton per acre without sulphur, and 6½ tons per acre with 300 pounds of sulphur. With 600 pounds of gypsum or 820 pounds of superphosphate in fertilizer, yield was 8¼ tons per acre.

Officials Know Benefits

The growing concern over sulphur and other secondary and minor elements is aptly summarized by Dr. Howard T. Rogers, head of agronomy and soils work at Alabama Polytechnic Institute: "There is no doubt about the importance of calcium, magnesium and sulphur in fertilizers for Alabama crops and soils. As long as all mixed fertilizers sold in the state contain adequate amounts of these elements, their regulation will not be of serious concern. However, if sulphur-free mixtures are marketed in appreciable quantity, it would appear advisable to consider regulation and control of this element. . . . If complete fertilizers without sulphur, such as some of the nitric phosphates, are offered for sale (in Alabama) the Experiment Station will not recommend their use on cotton."

When you ammoniate superphosphate as a base for mixed fertilizers, you are giving farmers a big extra value in free sulphur and calcium essential to profitable crop production on many soils. It pays to tell your customers about these extra benefits.



Grass and trees are two big tonnage opportunities for development by the fertilizer industry.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

FERTILIZER MAKES GRASS GROW HIGH-PROTEIN FEED

More fertilizer is needed on grass pasture and haylands. Its use can bring big profits to farmers and to fertilizer manufacturers.

For example, most haylands produce only 1½ tons of low-protein feed per acre, and pastures even less. But many leading farmers now are using several hundred pounds of mixed fertilizer per acre. The result? Yields range up to 4 or 5 tons per acre of high-protein feed, and these farmers reap a sizable return on their fertilizer investment.

Outstanding Results

Wisconsin dairymen and farmers have achieved outstanding results by using 500 pounds of 10-10-10 per acre on mixed legume-grass and grass meadows. In 403 farm tests, this fertilizer brought, on the average, an extra 1¾ tons of dry weight feed per acre, with total yield averaging more than 3 tons per acre. Unfertilized land ran just under 1½ tons of feed per acre. The extra feed produced by fertilizer was worth $61 per acre more than the fertilizer cost.

Continuing New Jersey experiment station work is successfully producing high-protein, high-tonnage pasture and hay forage. Feeding tests show that well-fertilized, deep-rooted grasses produce about as much milk as alfalfa and higher daily weight gains of beef and mutton. Persistent stands of well-fertilized grass may replace alfalfa on millions of acres where alfalfa is expensive to grow and stands last only 3 years.

Yields of grass forage in 3½ years of New Jersey tests have averaged as high as 3¾ to 4½ tons dry weight per acre, with protein content of 15 to 19%. Total digestible nutrients in the grass were approximately 64 to 68%, somewhat higher than alfalfa and equal to a good grain ration.

Need Balanced Fertilizer

The New Jersey grass plots all were fertilized with 500 pounds of 5-10-10 at seeding time. They also received the equivalent of 1,000 pounds of 10-10-10 each succeeding year, with additional nitrogen on the highest yielding plots. This practical level of fertilization produced 4 tons per acre of grass hay, containing 1,230 pounds of protein, at a fertilizer cost of $48 per acre. The homegrown protein cost only 4 cents per pound—far less than any protein supplement.

Balanced Growth

In mixed legume-grass seedings, many farmers like to use high-nitrogen fertilizer to keep up the grass content of the mixture to control bloat. Because grass is a better forager for potash than legumes, this may speed disappearance of legumes from the mixture. Balanced fertilizer such as 10-10-10 supplies the potash to help legumes, as well as nitrogen to build big grass yields and high protein content.

Fall is an ideal time to fertilize pastures and haylands. Spreading is faster and easier on the firm soil. The fertilizer not only produces more feed, but also builds strong food reserves in the roots for earlier growth and earlier grazing in the spring. The more pasture and hayland fertilizer you sell to farmers this fall, the more profit you and your customers will make!

FOREST TREES ARE A BIG MARKET FOR FERTILIZERS

Trees respond to fertilizer just as other plants do. Farmers, paper and lumber companies, and state experiment stations are now conducting many tests to find out how well forest tree fertilization pays. Now is a good time to run some tests on tree feeding in your area, to prepare for this big potential market.

In another 50 years we will need twice our present production of 47 million board feet of lumber. Use of pulpwood has shown an enormous increase. And our growing population uses Christmas trees in increasing quantities each year.

490 Million Acres

We are now planting nearly a million acres of forest trees per year. But more than half of our 490 million acres of commercial forest land is in a poor state of productivity. Much of this land can produce more wood and more income faster with fertilizer.

Some of the tests of fertilization of forest trees are promising indeed. Tree nurseries have found that fertilizer improves the size and vitality of nursery stock. It also improves the survival and speed of growth of young trees used in forest planting.

Where fertilizer has been used on seed trees left in clear-cut forest land, the increase in seed production has been as high as 1,000 per cent. Fertilization of partly grown trees also can save much labor in thinning and pruning. The quick growth with fertilizer kills out the lower limbs fast, and also enables larger trees to suppress smaller trees.

Forest soils in different areas vary widely in fertilizer needs. Some need potash, some need magnesium, some need phosphorus, and practically all need nitrogen.

Rapid growth of trees with fertilizer may be better for pulpwood and timber than for fine lumber production. But even Christmas trees benefit from fertilizer under the right conditions. On poor native soils, on eroded or worn out land, and on spoil banks left after strip mining, fertilizer can make a huge difference in tree growth.

Ground application of fertilizer is easy in nurseries and small, level woodlots. For large trees and for rough, hilly and mountainous country, aerial application of concentrated fertilizers is the only practical method.

Write for Information

Now is a good time to establish small acreage fertilization of forest trees and Christmas tree plantings in your marketing area. For information on forest fertilization, write to Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for NITROGEN *plus* SERVICE. Look over the big line and contact one of the 14 offices listed below.

Arcadian® Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-S®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer
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NITROGEN DIVISION Allied Chemical & Dye Corporation

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THE FERTILIZER SITUATION 1956-57

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The Fertilizer Situation for 1956-57 is the fourteenth in a series of annual reports issued by agencies within the U. S. Department of Agriculture.

In the preparation of this report helpful assistance was given by the Bureau of the Census, Department of Commerce; Bureau of Mines, Department of the Interior; Chemical and Rubber Division, Business and Defense Services Administration; the Fertilizer and Agricultural Lime Section, Soil and Water Conservation Research Division, Agricultural Research Service; and members of the industry. This assistance is gratefully acknowledged.

A Review

The total supply of nitrogen, phosphates, and potash for the 12 months ended June 30, 1957 is currently estimated to have been slightly less than for the previous year. This estimate is based on industry's reported rates of production rather than on capacity to produce, since capacity is in excess of actual output. Also there were substantial increases in exports of phosphorus and potash.

The 1956-57 fertilizer season was slow in starting. Throughout much of the fertilizer year great sections of the country suffered from extreme drouth. During the first and second quarters reports from the mid-South, mid-West, and Southwest indicated severe crop damage due to high temperatures and lack of moisture. In the Northeast vegetable crops and pastures were hard hit by dry weather.

Spring deliveries (March-April) were reported to be spotty with some price cutting, due in part to the slow market. Heavy spring rains, even disastrous floods in some areas, prevented farmers from spreading fertilizer. More normal rainfall in sections of the mid-West, on the other hand, caused an upturn in movement in these sections.

With no yardstick, and no historic pattern to use as a guide, it is hard to predict the impact of the Soil Bank on fertilizer use. Should foreseeable markets seem sufficiently attractive to cover costs and return a reasonable profit, it is logical to suppose that farmers would use more fertilizer on a reduced acreage. However, without experience under this program realistic forecasts cannot be made.

The fertilizer industry, particularly in the case of nitrogenous materials, has more production capacity than it can use at present. However, both private and Government market analysts predict that this is a temporary condition and that demand will be equal to capacity within less than five years.

It is expected that growing demand for all fertilizers will result from increased use in present farm operations as well as from numerous new practices.

Agronomists have pointed out repeatedly that farmers' income could be raised substantially by using fertilizer in accordance with recommendations by State experiment stations. In one southern State, for example, it was estimated that farm income in 1955 would have been increased by over $200 million of approved fertilizer recommendations and other cultural practices had been followed. This is a matter of education, and many segments of the industry are sponsoring demonstration programs.

Pasture and range fertilization offer opportunities for profitable use of fertilizers. Field trials in a number of different areas show that such practices substantially increased growth of grasses and legumes. Livestock turned on such lands showed marked weight increases over stock on non-fertilized fields.

Farm ponds are becoming increasingly important, both as a supply of food and for recreation. It has been found that by fertilizing microscopic plant growth in these ponds the weight of fish can be boosted by as much as 400 percent.

Another potential outlet for the fertilizer industry is fertilization of

Table 1.—Plant food consumption in continental United States, Hawaii, and Puerto Rico 1935-36 through 1955-56, and estimated supply for 1956-57

Period and Year	Consumption[1] Nitrogen (N)	Available Phosphoric Acid (P_2O_5)	Potash (K_2O)	Total	
	Tons	Tons	Tons	Tons	
1935-36	350,000	673,000	350,000	1,373,000	
1936-37	411,000	794,000	416,000	1,621,000	
1937-38	384,000	744,000	393,000	1,521,000	Index
1938-39	398,000	789,000	409,000	1,596,000	(Percent)
1935-39 Av.	371,000	719,000	375,000	1,465,000	100.00
1939-40	419,000	912,000	435,000	1,766,000	120.55
1940-41	458,000	994,000	467,000	1,919,000	131.00
1941-42	409,000	1,131,000	547,000	2,087,000	142.46
1942-43	509,000	1,237,000	643,000	2,389,000	163.18
1943-44	640,000	1,408,000	649,000	2,697,000	184.09
1944-45	630,000	1,354,000	729,000	2,713,000	185.19
1945-46	701,000	1,553,000	807,000	3,061,000	208.94
1946-47	784,000	1,736,000	858,000	3,378,000	230.59
1947-48	857,000	1,854,000	921,000	3,632,000	247.89
1948-49	920,000	1,942,000	1,073,000	3,935,000	268.60
1949-50	1,005,000	1,951,000	1,105,000	4,061,000	277.00
1950-51	1,237,000	2,110,000	1,380,000	4,058,000	322.66
1951-52	1,422,000	2,199,000	1,581,000	5,202,000	355.09
1952-53	1,637,000	2,271,000	1,738,000	5,646,000	385.39
1953-54	1,847,000	2,235,000	1,814,000	5,896,000	402.46
1954-55	1,961,000	2,284,000	1,875,000	6,120,000	417.75
1955-56	1,933,000	2,247,000	1,875,000	6,055,000	413.31
		Supply[2]			
1956-57	2,265,000	2,352,000	1,874,000	6,491,000	443.07

[1]Plant food contained in commercial fertilizers, adapted from data compiled by the Fertilizer and Agricultural Lime Section, Soil and Water Conservation Research Division, ARS.
[2]Estimated; see tables 2, 6 and 7.

Table 2.—NITROGEN: estimated 1956-57 fertilizer supply compared with 1955-56 and 1954-55, United States and possessions [1]

(In tons of 2,000 pounds nitrogen content)

Item	1956-57[2]	1955-56	1954-55
U. S. Production			
Synthetic ammonia	2,023,000	1,945,000	1,791,000
By-product ammonia	178,000	201,000	183,000
Natural organics	30,000	30,000	30,000
Total	2,231,000	2,176,000	2,004,000
Imports	287,000	330,000	373,000
Exports	253,000	255,000	141,000
Difference	34,000	75,000	232,000
Available for fertilizer purposes	2,265,000	2,251,000	2,236,000

[1] These figures are based on rates of production, plus imports and minus exports.
[2] Estimated.
Source: Bureau of the Census "Facts for Industry M28A—Inorganic Chemicals" and Reports No. FT 110 and FT 410; Bureau of Mines monthly coke report "Coke and Coal Chemicals."

Table 3.—Imports of nitrogenous materials for the 8-month period July 1956-February 1957 compared with the same period in 1955-56

(In tons of 2,000 pounds nitrogen content)

Material	1956-57 (8 mos.)	1955-56 (8 mos.)
Ammonium sulfate	22,065	21,679
Ammonium nitrate	65,001	66,991
Calcium cyanamide	9,526	13,269
Calcium nitrate	4,897	6,564
Sodium nitrate	36,667	51,015
Urea	13,990	21,849
Ammonium phosphate	15,542	18,197
Other nitrogenous materials[1]	1,413	2,217
Potassium nitrate	78	105
Potassium sodium nitrate	2,423	775
Prepared fertilizers[2]	2,311	1,011
Total	173,913	203,672

[1] Includes estimated nitrogen content of guano, dried blood, castor bean pomace, and fish scrap.
[2] Includes estimated nitrogen content of compounded or chemically combined fertilizers.
Source: Bureau of the Census "Report No. FT 110"

Table 4.—Exports of selected nitrogenous materials for the 8-month period July 1956-February 1957 compared with the same period 1955-56, and their monetary value, by countries

(In short tons of 2,000 pounds material)

	1956-57		1955-56	
AMMONIUM SULFATE	material	value	material	value
Cuba	33,214	$ 1,024,848	23,270	$ 883,347
Mexico	32,260	1,272,755	28,084	1,423,693
Pakistan	65,127	2,326,393	48,179	2,020,615
Korea	61,967	2,305,411	160,832	7,034,522
All others	266,615	10,287,410	185,321	7,872,713
Total	459,183	$17,216,817	445,686	$19,234,890
AMMONIUM NITRATE				
Mexico	17,085	$ 1,289,980	21,082	$ 1,473,365
Greece	9,038	616,470	18,212	1,132,402
Korea			33,256	2,351,282
All others	4,091	204,057	661	43,363
Total	30,214	$ 2,110,507	73,211	$ 5,000,412
NITROGENOUS CHEMICAL MATERIALS[1]				
Canada	17,091	$ 881,307	19,936	$ 1,139,853
Mexico	9,005	996,429	3,572	444,360
Korea	26,869	1,393,213	6,621	672,059
All others	25,334	2,235,233	17,881	1,482,940
Total	78,299	$ 5,506,182	48,010	$ 3,739,212

[1] Includes urea, calcium nitrate, cyanamid, and various others.
Source: Bureau of the Census "Report No. FT 410"

forests. Already practiced to some extent in Europe, this use of fertilizer has only recently been given attention in the United States.

One specific non-farm fertilization program which holds great possibilities for the industry is the new Federal highway program with its attendant roadside development. When completed, the 41,000 miles of new highways will present an opportunity for the use of a considerable tonnage of fertilizers. Cuts for these new roads will require cover crops to control erosion and run-off, and these in turn will require fertilization—not only in establishing crops but in annual up-keep. According to a statement issued by the National Plant Food Institute and the American Road Builder's Association an estimated 250,000 to 400,000 tons of fertilizer could be used effectively in establishing these cover crops, while approximately 125,000 tons would be needed annually for maintenance.

Non-farm use of fertilizer—application to parks and roadsides, lawns and home gardens—has increased continuously in recent years.

Industrial uses of ammonia, which now represent approximately 24-25 percent of production are expected to increase. Present expanding uses for ammonia include the production of chemicals, plastics, explosives, and synthetic fibers. It is believed that continued research will develop new industrial uses for ammonia that, with growing agricultural consumption, could span the gap between present capacity and actual production within a few years.

Use of fertilizer-pesticide mixtures was estimated to have been 149,000 tons in 1953-54, an increase of 71 percent over the previous year. It is expected that definite figures regarding the consumption of these mixtures in 1955-56 will be available this fall when results of a survey by the Soil and Water Conservation Research Division, ARS, will be reported.

Except for 1955-56, in each year since 1937-38 total use of fertilizer has shown an increase (table 1). It is expected that the trend toward use of higher analysis materials will continue.

Nitrogen

During 1956-57 the quantity of fertilizer nitrogen in all forms expected to be available for use by farmers is placed at approximately 2,265,000 tons. Since this figure is based on published figures for 9 months and

estimated rates of production for the remainder of the year, demand during recent weeks may require revision of this figure.

Details of the 1956-57 estimated supply, with comparative data for two previous years, are shown in table 2. Supply figures for nitrogen are usually somewhat higher than the net amount consumed. This is due to a number of factors. Supply data do not reflect losses incurred in the manufacture, handling, and distribution of fertilizers, but are on the basis of trade deliveries reported by primary producers. Also some uses, other than plant food, are supplied out of these deliveries.

Imports of nitrogenous fertilizer materials are expected to be less in 1956-57 than in the previous year. Figures for the first 8 months of the fertilizer year, compared with the same period in 1955-56, are shown in table 3.

Exports of selected nitrogenous materials are shown in table 4. Less ammonium nitrate was exported than a year ago, while exports of ammonium sulfate and the group reported by the Bureau of the Census as "nitrogenous chemical materials, n.e.c." showed an increase.

Expansion of domestic production of nitrogen has far out-stripped the original goal set by the Defense Production Administration in 1952. This goal, which was to be realized in 1955, was for all purposes (agricultural and industrial). Included were such forms of nitrogen as synthetic ammonia, by-product ammonia, nitraphosphates, etc. Originally this expansion goal was set at 2,930,000 tons by 1955. It was amended in February 1954 by the Office of Defense Mobilization, the production goal being raised to 3,500,000 tons by January 1, 1957.

Rated annual capacity of synthetic ammonia producers alone neared the ODM goal by the end of 1955, when 28 companies with an annual capacity of 3,292,400 tons were reported on stream. This was an increase of more than 10 percent over the previous year when capacity was reported to be 2,986,800 tons. By May 1957 U. S. synthetic ammonia capacity by itself had exceeded the goal by nearly 300,000 tons of nitrogen (table 5).

Phosphates

U. S. production of phosphates for fertilizer purposes in 1956-57 is currently estimated to be 2,521,000 tons, or slightly in excess of last year. With the decrease in imports, and continued increase of exports, the supply available for fertilizer purposes is estimated to be 2,352,000 tons. For the nine months July 1, 1956-March 31, 1957 exports of normal and concentrated superphosphates were above the corresponding period in 1955-56 by 15.9 percent and 82.4 percent respectively.

Details of the estimated supply for 1956-57, with comparative data for the two previous years, are shown in table 6.

Potash

It is estimated that deliveries of agricultural potash from U. S. production for the United States and its possessions amounted to approximately 1,940,000 tons. There was an increase in imports of less than 10 percent, while exports showed a gain of approximately 39 percent. Details of the estimated fertilizer supply for 1956-57 are shown in table 7.

Table 5.—Rated annual capacity of synthetic ammonia producers for selected years 1940-1957

(short tons N)

Year (as of Dec. 31)	Number of companies	Number of plants	Rated annual capacity
1940	8	9	390,300
1950	13	19	1,500,000
1954	22	35	2,986,800
1955	28	42	3,292,400
1956	32	46	3,560,900
1957 [1]	36	50	3,782,400

[1] Preliminary as of May 1957
Source: Business and Defense Services Administration

Table 6.—PHOSPHORUS: Estimated 1956-57 fertilizer supply compared with 1955-56 and 1954-55, United States and possessions

(In tons of 2,000 pounds available phosphoric oxide P_2O_5)

Item		1956-57 [1]		1955-56		1954-55
U. S. Production						
Normal and enriched superphosphate		1,585,000		1,604,000		1,601,000
Concentrated superphosphate		736,000		775,000		631,000
All other [2]		200,000		120,000		76,000
Total		2,521,000		2,499,000		2,338,000
Imports	54,000		53,000		61,000	
Exports	223,000		153,000		154,000	
Difference		169,000		97,000		93,000
Available for fertilizer purposes		2,352,000		2,402,000		2,245,000

[1] Based on 8 months' published figures and estimated rates of production for remainder of year.
[2] Includes wet-mixed base goods, basic slag, liquid phosphoric acid, and P_2O_5 content of mixed fertilizers.
Source: Bureau of the Census "Facts for Industry M28D—Superphosphate and Other Phosphatic Fertilizers" and Reports No. FT 110 and FT 410

Table 7.—POTASH: estimated 1956-57 fertilizer supply compared with 1955-56 and 1954-55, United States and possessions

(In tons of 2,000 pounds of potassium oxide K_2O)

Item		1956-57 [1]		1955-56		1954-55
U. S. Production						
Muriates [2]		1,800,000		1,739,000		1,687,000
Sulfates [2]		111,000		106,000		107,000
Manure salts [2]		3,000		2,000		1,000
Other [3]		26,000		26,000		26,000
Total		1,940,000		1,872,000		1,821,000
Imports [4]	184,000		170,000		139,000	
Exports [4]	250,000		180,000		91,000	
Difference		66,000		10,000		48,000
Available for fertilizer purposes		1,874,000		1,862,000		1,869,000

[1] Based on actual production for 9 months and estimated rates for remainder of the year.
[2] Reported by the American Potash Institute.
[3] Includes potash content of natural organics and miscellaneous fertilizers.
[4] Bureau of the Census Reports No. FT 110 and FT 410.

N & P Overcome Cold Soil Problem

Depression of growth in cold soil has been under study in greenhouse experiments by the Canadian Department of Agriculture. Crops grown in soil maintained at 50 degrees F. were compared with crops grown in soil at the greenhouse temperature of 60 to 90 degrees F. In each case the tops of the plants were subject to the air temperature of the greenhouse. In all experiments the rate of growth was materially lowered and the yield was smaller where unfertilized soil was held at the lower temperature. However, when a fertilizer containing adequate nitrogen and phosphorus was used both the growth rate and yield were increased to that of the warm soil even when fertilizer increased yield from the warm soil.

Root growth was somewhat parallel to top growth. At the cooler temperature where no fertilizer was used root development was slower and a smaller root system developed. Where fertilizer was used the root growth in the cool soil was greater than at the warmer temperature.

The kind of fertilizer was important. One containing both sufficient nitrogen and phosphorus was essential if growth depression was to be overcome. Neither one alone was sufficient. In general, in the greenhouse an application of 100 pounds of 11-48-0 and at least 120 pounds of 33.5-0-0 was satisfactory.

At a soil temperature of 50 degrees F. bacterial activity is greatly reduced so that the nitrogen in unavailable form is changed very slowly to a form available to the plants. Little is known about the temperature effect on phosphorus availability but an experiment using radioactive phosphorus showed that at the lower temperature a greater use was made of fertilizer phosphorus than at the higher temperature.

These observations have been made under greenhouse conditions but similar results have been noticed in the field. If seeding is done early in a cold soil then the use of a combined nitrogen and phosphorus fertilizer will help in overcoming a growth depression which might occur if cold weather continued for some time after seeding.

Liquid Mixed Fertilizers

PROGRESS AND PROBLEMS

by A. V. Slack
Tennessee Valley Authority
Wilson Dam, Alabama

The application in liquid form of fertilizers containing two or more plant nutrients is fairly new in the central and eastern parts of the country, the first plants having started up only three or four years ago. On the Pacific Coast the practice is much older but even there the liquid mixes did not assume a substantial place in the fertilizer field until a few years ago. A survey of practices and problems in the industry was made in 1955 (**6**). Since then changes and developments in this fast-growing field have made desirable the present review, which like the previous one is based on visits and correspondence with many producers, raw material suppliers, and engineering firms. Emphasis in this review is on practice in the central and eastern parts of the country.

Growth of the Industry

In the 1955 survey about 35 liquid mixed fertilizer producers were identified in the central and eastern regions. This included only those plants producing fertilizer for general farm application rather than for specialty use. As shown in Figure 1, the present survey shows a total of approximately 115 plants in the same area (as of May 1957). For the whole country the corresponding figures are 72 in 1955 and 166 in 1957. Although these figures are subject to several sources of error they serve to show the general trend in growth of the industry. The rate of growth in the central and eastern areas has been much faster than in the West. Growth has been especially rapid in the Iowa-Illinois-Indiana-Ohio area; in fact this might be said to be the present center of the industry since more plants are reported there than for the far western area, formerly the unquestioned leader. Some expansion into areas which previously had few or no plants is also noted. Even the Southeast—where the low cost of superphosphate is a major handicap to liquid mixes—now has a few plants. Consideration of the number of plants in various areas indicates that the cost of phosphate is the controlling factor. Those sections which have the least differential between cost of superphosphate and phosphoric acid have the fastest rate of growth in number of liquid mix plants.

The pattern of growth in the industry is an interesting one. Liquid mixing, being an entirely different type of operation from conventional fertilizer production, has attracted newcomers to the fertilizer field. Solids producers, with capital already tied up in plants, generally have preferred to use available capital in expanding or improving their existing plants rather than for changing to a new process. Very few of the present liquid mix producers made fertilizers of any kind before they entered the liquids field. However, the few exceptions are important since most of them represent efforts by larger solids producers to test liquid mix markets and new developments.

A situation frequently found in the setting up of a new liquids plant is that of an operator of some local enterprise of an agricultural type—such as a farm, elevator, or farm chemical business—learning of the new liquid mix method and setting up a plant to operate in conjunction with his already-going operation. These plants serve an area normally no more than 25 miles or so in radius. A larger territory may be covered by distribution through dealers but these tend to set up plants themselves as demand develops.

Thus the current pattern of expansion in the industry appears to be one of newcomers to the field setting up plants to serve relatively small areas. There appear to be a great many areas which are as appropriate for a plant location as those already taken up. On this basis it may be expected that the number of plants will continue to grow unless some major change in the situation should intervene.

Although the increase in number of plants is a noteworthy development, production is still relatively minor as compared to that of solid mixtures. Practically all liquid mix plants in the central and eastern areas are quite small in comparison to conventional fertilizer plants. Only a very few plants produced as much as 3000 tons last year and many of them, for a number of reasons, made less than 1000 tons; a figure of 1500 tons as the average is probably on the liberal side. On this basis the total production in 1956 was about 150,000 tons in the central and eastern sections. This is a great increase over the 4274 tons reported for the year ending June 30, 1954 (**6**) but is very small in comparison with the nearly 15 million tons of solid mixtures produced in the same area in 1956.

In California the liquid mixes have continued to gain and hold a significant position in relation to solid mixed fertilizers. However, in contrast to other sections, consumption of mixtures is relatively low in California in comparison to unmixed materials. In 1953 the liquid mixtures accounted for about 9% of all mixtures used in California. In 1956 this figure had risen to 18%, a considerable margin over the approximately 1% for the Central and Eastern states.

A development which may have some impact on growth of the industry is the recent merging of the nitrogen solution and liquid mixed fertilizer groups. In their annual meeting in October 1956, the National Nitrogen Solutions Association combined with the previously unorganized liquid mix group and renamed the organization the National Fertilizer Solutions Association. With the closer amalgamation of interests of the two groups, it might be expected that more established nitrogen solution dealers would take on liquid mixed fertilizer production as an addition to their activities.

No major changes in types of grades being produced was noted in this survey, other than that as the industry moves into the South there is more demand for the nitrogen-potash type. This type is fairly popular in solid fertilizers used in the area, 14-0-14 being a popular grade in some states. In liquid mixes the grade is limited to about 10-0-10 for a urea-potassium chloride solution and to about 6-0-6 for ammonium nitrate-potassium chloride. A few grades such as 3-12-0 and 6-20-0, which are unusual in the Midwest, were noted in that area.

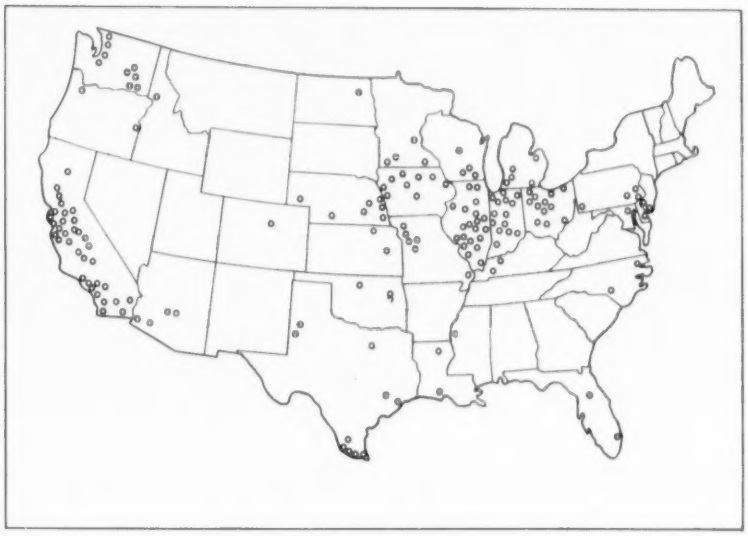


Figure 1. Approximate location of liquid mixed fertilizer plants

One of the more important developments is that more research and development is being done on the problems of the industry. At the inception of liquid mix manufacture in the central and eastern regions very little information was available—published or otherwise—on problems in manufacture and application, and very few organizations were giving any attention to research and development on the problems. Today, however, a great many producers, suppliers, engineering firms, and university and government laboratories are working on one phase or another of the problems of the industry. Very little of this has been published as yet, but considerable information is available in the form of preliminary reports from laboratories, engineering firm prospectuses, and supplier data sheets and bulletins.

Concentration of Solutions

One of the main problems is the limited solubility of the materials used, which prevents attainment of grades as high in analysis as those made in the solid fertilizer industry. Fertilizers containing as much as 60% plant food are being made in solid form and grades such as 14-14-14, 12-24-12, and 8-16-16 are among the leaders in some sections of the country. Liquid mixes, in contrast, are limited to 9-9-9, 8-16-8, and 5-10-10 if the salting-out temperature is to be kept below 32° F. Each year the average plant food content of fertilizers over the country increases and each increase puts the liquid mixes at more of a disadvantage.

Certain plant food ratios are also a problem, mainly in the North Central states where 1:4:4 and O-x-x grades are very popular. In making liquid mixtures a 1:3 N to P_2O_5 ratio is required to neutralize the acid. Thus a 1:4:4 or O-x-x would be an acid mixture which few producers are equipped to handle. This is a serious disadvantage since almost half the tonnage in the North Central states is of this type.

The extent of the concentration and formulation problem is indicated by a consideration of the fifteen principal grades of mixed fertilizers in the country in the year ended June 1955. At least seven of these grades could not have been made in liquid form without incurring acidity or a salting-out temperature above 32° F.

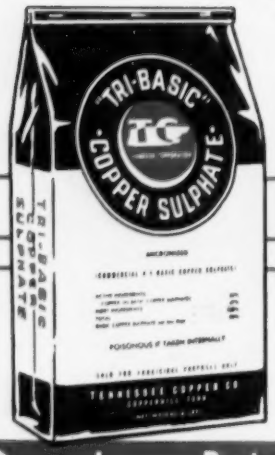
The concentration problem has caused urea to grow in favor over ammonium nitrate as the source of supplemental nitrogen, since it gives higher solubility for most plant nutrient ratios. Little or no ammonium nitrate is being used in the central and eastern regions, either in the solid form or as a component of ammoniating solutions. In the Far West, where there was no nearby source of urea until this year and mixed fertilizer analyses are lower, the situation is somewhat different.

For grades low in potash some increase in solubility can be obtained by reducing slightly the amount of ammonia reacted with the phosphoric acid. For example, the industry normally uses enough ammonia to give a 1:3 NH_3 to P_2O_5 weight ratio, at which an 8-24-0 is the highest 1:3:0 grade which can be made without exceeding a 32° F. salting-out temperature. However, if the ammoniation is decreased to a ratio of about 0.95:3—which can be done without appreciably decreasing the pH—a grade as high as 9-29-0 can be made without exceeding the 32° F. limit. This has some disadvantage in that the cost of the nitrogen would be increased slightly in those grades which require supplemental nitrogen. Operating control would be a little more critical, since missing the 0.95:3 ratio in either direction at the 9-29-0 concentration level would tend to give a high salting-out temperature. There is little indication that this method is being used in the central and eastern areas to increase concentration. However, in the Far West a 9-28-0 grade is produced.

A common practice in avoiding the concentration or salting-out problem is to make up the solution at a high concentration and get it on the field before it has time to cool and crystallize. This would appear to be a risky operation but it seems to work out fairly well where most of the product is distributed locally. For example, 4-12-12, which crystallizes at 77° F., has been made and distributed in Midwest winter weather by this method.

Where application can be made within a short time after making up the mixture, the tendency of the solutions to supercool is an advantage. This tendency is greater in those solutions from which ammonium phosphate crystallizes (rather than a potash salt) when salting out occurs. Langguth et al. (**4**) found that ammonium phosphate is the stable solid phase in most solutions which have a P_2O_5:K_2O weight ratio of 2.0 or more and a P_2O_5:N ratio of 1.0 or more. Some continuing use of inhibitors to enhance and stabilize this supercooling is reported. In one instance, a decrease of 34° F. in the salting-out temperature for a particular grade was reported. An additive of this type was placed on the market recently by one of the engineering firms (**1**). No information is available on the composition or effectiveness.

Work at TVA on crystallization inhibitors has indicated a significant effect with some additives but dependability was poor, i.e., duplicate samples gave widely varying results as to the length of time that crystallization was delayed. Additives tested were hydrophilic colloids (agar, dextrin, cornstarch, etc.),



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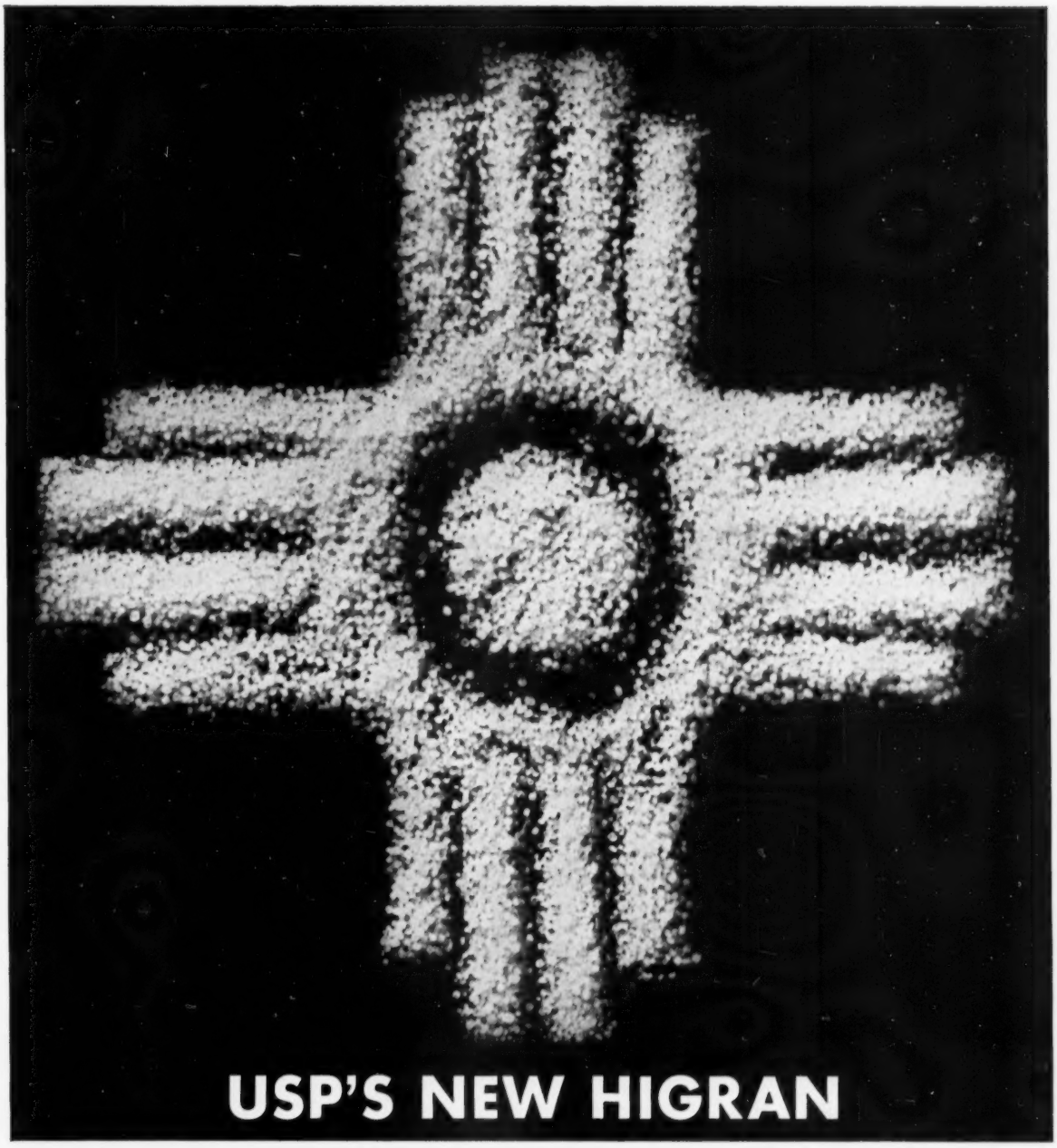

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surfactants, dyes, and metallic ions. The metallic ions were found to be the most effective, with chromium, iron, and aluminum the best of those tested. Small amounts of these caused a delay in crystallization for several days in solutions stored at temperatures as much as 27° F. below their normal crystallization temperature. As noted above, however, duplicate samples did not behave consistently.

The same inhibiting effect was noted in solutions made from wet-process phosphoric acid rather than furnace acid. The former contained iron and aluminum from the phosphate rock and these caused a significant delay in crystallization.

One of the more promising approaches toward increasing the concentration of liquid mixtures is the use of pyrophosphate or metaphosphate as the source of P_2O_5 rather than the orthophosphate normally used. Work on this method is in progress at TVA. By an alteration in the furnace phosphoric acid process, acid containing 76% P_2O_5 is produced as compared to 54% in normal furnace acid. This acid has about one-half its P_2O_5 in the pyrophosphate form. A neutral solution of 12-36-0 grade can be made by ammoniating the concentrated acid, as compared to 8-24-0 when standard acid is used. The 12-36-0 does not crystallize on extended storage at 32° F. Further solubility studies are in progress.

A 12-36-0 can also be produced from ammonium metaphosphate. The latter is produced by burning phosphorus with dried air and mixing the cooled products of combustion with gaseous ammonia. The 12-36-0 is made by scrubbing the gas with water to collect and dissolve the solid reaction product. Production of liquid fertilizer by this method appears to be feasible but is not as promising as ammoniation of concentrated phosphoric acid.

In connection with the liquid fertilizer concentration problem there is a need for more data on crystallization temperature for various grades and plant nutrient ratios. The only system studied reported—with one exception—that apply to liquid mixtures are three-component types such as NH_3-H_3PO_4-H_2O, NH_4NO_3-KCl-H_2O, and others. The exception is a study reported in 1955 by Flatt (**3**) of the four-component system NH_4NO_3-NH_3-H_3PO_4-H_2O. Langguth et al. (**4**) have reported data on crystallization temperature of solutions having standard plant nutrient ratios, expressed as the highest grade which will crystallized in the lower temperature ranges for colder sections of the country and in the higher ranges for the warmer regions; the effect of NH_3:H_3PO_4 ratio and of type of supplemental nitrogen should also be explored further. Work on these is being carried out at TVA.

One approach which has been proposed as a way of reducing the concentration problem is to omit potash from the liquid fertilizer and apply it separately and less frequently. By omitting the potash higher total plant food contents can be achieved. For example, for plant nutrient ratios of 1:3:0, 1:3:1, 1:3:2, 1:3:3, and 1:3:4, and with normal raw materials, the respective maximum total nutrient contents for crystallization below 32° F. are 32, 30, 24, 20, and 16%. Separate broadcast addition of potash has been proposed also for solid fertilizers, as a means of avoiding excessive chloride concentration in the row and avoiding the cost of mixing.

Raw Material Cost

A major problem in liquid mixture production is the cost of raw materials. In most areas P_2O_5 in the form of acid costs more than as the superphosphate used in solid mixture production. However, the liquids producer has some advantage in regard to the nitrogen, since more nitrogen in the relatively low cost solution form can be used. Moreover, more ammonia—the least expensive of the nitrogen sources—can be used in making liquid mixtures. About 8 pounds ammonia per unit of P_2O_5 is normally used, without any appreciable ammonia loss, whereas in solid mix production ammoniation at this rate would result in loss of a pound or more of nitrogen. The average rate in the solid fertilizer industry has been increased in the past two or three years and many producers now ammoniate at a 6-pound rate without excessive ammonia loss. However, the higher rate decreases water solubility of phosphate and makes the product more subject to phosphate reversion.

The use of solid urea as a source of supplemental nitrogen continues even though it is normally more expensive than solution forms. Convenience in storage and market availability are factors in this. However, there is a distinct trend to the solution form, especially the urea-ammonium nitrate type (32% N). Ammonium nitrate solution (83% solution; 29% N) and urea solution (18.6% N) are also available but do not appear to be used much in liquid mixes. The high salting-out temperature of the ammonium nitrate solution makes it require special handling and the low nitrogen content of the urea solution makes shipping cost relatively high. The principal drawback to the urea-ammonium nitrate solution is the effect of the ammonium nitrate in increasing the salting-out temperature of the product. One exception to this general rule is in connection with 10-10-10. It has been reported (**2**) that supplying about one-fourth of the supplemental nitrogen as ammonium nitrate and the remainder as urea gives a lower crystallization temperature than if urea alone is used. However, the standard 32% solution is about half-and-half urea and nitrate. Therefore, producers who try to realize the advantage of the eutectic composition mix 32% solution with urea-ammonia solution to get the proper nitrate-urea ratio.

A new solution of the urea-ammonium nitrate type has been announced recently. It has the same nitrogen content (32%) but contains 1% ammonia in addition to the nitrate and urea. It is said to be easier to produce and has a somewhat lower crystallization temperature than the standard 32% solution.

The use of ammoniating solutions in liquid fertilizer production is limited as compared to use in the solid fertilizer industry. In the latter, such solutions can be used to supply all the nitrogen for a wide range of grades. However, in the liquids field the amount of free ammonia which can be used is fixed within narrow limits by the amount of phosphate, whereas the amount of supplemental nitrogen must vary to make the grade. Thus a single solution is not adequate as it is in solids production, where the degree of ammoniation can vary widely without causing any process problems. Since two sources of nitrogen must be used anyway, most producers use aqua or anhydrous ammonia to neutralize the acid because the ammonia has to be available for making grades such as 8-24-0 which do not require supplemental nitrogen. In conjunction with this the other nitrogen source could be an ammoniating solution—urea-ammonia-water, for example—but none of the solutions available commercially have

had a high enough ratio of urea to ammonia to give 2:1 or even 1:1 nitrogen-phosphate ratios in the product. Only recently one of the nitrogen companies has introduced such a solution (21% N), which has a high enough urea content to give a 2:1:0 solution when reacted with phosphoric acid. Use of this solution may make it possible to realize some of the economy of nitrogen solutions without unduly raising crystallization temperature.

Raw material cost might be reduced appreciably by using wet-process phosphoric acid instead of the furnace type. There have been several developments in this respect in the past year or so. Availability of the acid has been increased by one company going into production with all the product reported to be going on the market rather than being captive. In addition some of the companies which have captive plants have started selling and shipping acid.

Shipping of wet-process ("green") acid has been practiced for years in the West, where it is used widely in the unneutralized state. Special settling treatment before shipment is required to remove suspended or slowly precipitating impurities, and this adds somewhat to the cost. In the central and eastern sections, where shipping practice has not been developed very fully, several companies are giving consideration to the problems involved.

The main problem in using the acid is precipitation of impurities—mainly iron and aluminum — when the acid is ammoniated. There are several possibilities for coping with this problem. In the first place, the acid production process might be changed in some way to prevent or reduce extraction of the impurities from phosphate rock or to remove the impurities during the process. Some work on this is reported in the literature but it does not appear very promising. Or the acid can be treated to remove impurities, as is presently done in production of food-grade phosphates. The purification process might be somewhat different in purifying acid for liquid fertilizer use, since a lesser degree of purification would be required. Several laboratories are reported to be working on this approach.

Since the impurities precipitate when the acid is ammoniated, an obvious procedure is to filter out and discard them. However, the precipitate contains a substantial amount of phosphate which must be recovered. For this reason the method is more suited to producers who also have a solid fertilizer operation which can absorb the precipitate in to the solid product. It is not suited to small mixers. In the past year the process has been put into production by some of the phosphoric acid producers. The ammonium phosphate solution produced is sold for direct application or for use in liquid mixtures. One of the problems in the process is that impurities continue to precipitate after the initial filtration. However, those using the solution report that this causes no trouble since the amount is small and the particle size is not large enough to clog equipment.

Another possible approach is to treat the acid in some way to prevent precipitation of impurities when the acid is ammoniated. This leads to consideration of sequestering agents, which can tie up iron and aluminum in such a way that they do not precipitate even in a neutral solution. Several such agents are effective but the cost for most of them is too high. Pyrophosphate has been reported to be an effective se-

questering agent for such a system and offers some hope for economy. Work at TVA has shown that use of the pyrophosphate in concentrated furnace phosphoric acid as the sequestering agent has some promise. In preliminary tests, a clear solution after ammoniation was obtained by replacing a small part of the wet-process acid with concentrated acid. Minor precipitation occurred on standing, the significance of which has not yet been established.

Probably the most economical of the several possibilities is to allow the impurities to precipitate but to alter conditions so that a stable suspension is obtained. In work on this at TVA, rapid ammoniation of wet-process acid containing 30% P_2O_5 gave a stable suspension. In field tests with spray equipment this suspension was distributed successfully. The precipitated impurities were too small in particle size to clog the spray nozzles. Work on this method of using wet-process acid is continuing.

Storage Problems

The cost of storage—for both raw material and product—is a handicap to the liquid fertilizer producer since storage for liquids costs considerably more than for solids. Most producers minimize this difficulty by installing only a limited amount of product storage and operating on the basis of making up most of the product on order and pumping it directly to tank truck for transfer to dealer or customer. Raw material storage is also limited, usually only enough for a single tank car or tank truck of each material. One of the new plants in the Midwest, which appears to be typical in regard to storage, has 10,000 gallons acid storage, 42,000 gallons for aqua ammonia, and 16,000 gallons for product. The aqua is made from anhydrous directly from the tank car.

The acid storage is most expensive since stainless steel or a lined tank is required. One method for reducing cost which is growing in popularity is use of a plastic "bag" liner. The plastic is not bonded to the tank walls and therefore is less expensive than most linings.

Some companies have eliminated or reduced acid storage by setting up to convert the acid to a base solution directly from tank truck or car. Normally an 8-24-0 solution is made and then mixed as needed with supplemental nitrogen and potash.

Corrosion

Corrosion of tanks and equipment is a continuing problem in the industry. Most of the difficulty, however, is in regard to aluminum tanks and application equipment rather than the mild steel equipment used in the plant proper. Some of the midwestern plants now have three or four years' operating experience and mild steel seems to be standing up well, even when in contact with hot solution. However, as more of the nitrogen distributors take up liquid mix production and try to use their aluminum tanks and application equipment with the liquid mixtures, the problem of aluminum corrosion becomes more important.

Tests of corrosion of various metals by liquid mixtures have been reported by Vreeland and Kalin (**8**). Stainless steel was found to be quite resistant. The major attack on carbon steel was at the liquid-vapor interface, with occasional serious attack (including pitting) in areas exposed to vapor. Attack on aluminum was more general in nature but the overall rate was much higher than for steel.

Corrosion tests have also been made at TVA, under widely varying conditions of solution composition and temperature and with various aluminum alloys. The most severe corrosion was found in hot solutions and in those of high P_2O_5 content. While the degree of corrosion was found to be relatively high, the more resistant alloys do not appear susceptible enough to preclude their

Figure 2. Instrumentation in late model liquid mixed fertilizer plant

Courtesy of Barnard & Leas Manufacturing Co., Inc.

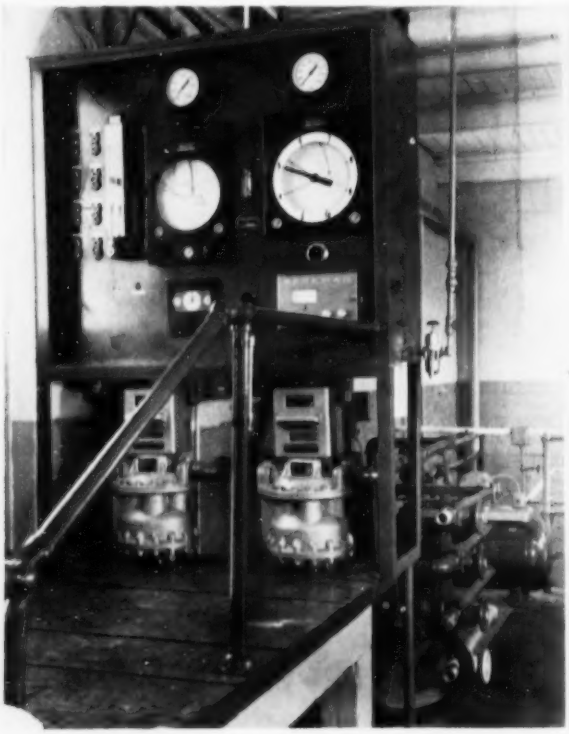
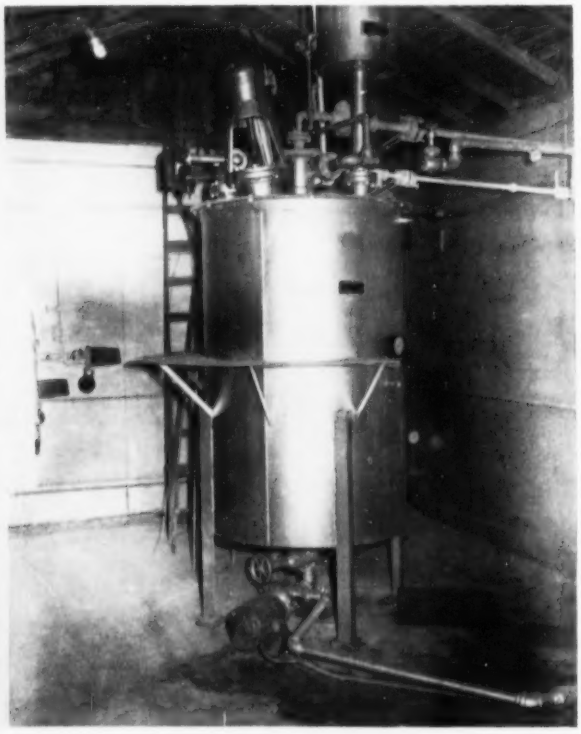


Figure 3. Continuous plant for making 8-24-0 solution

Courtesy of J. C. Carlile Corp.



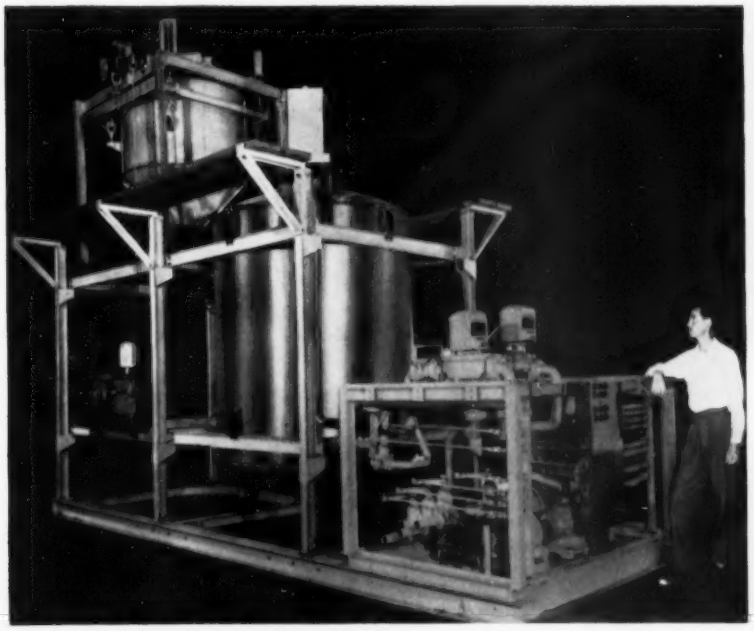


Figure 4. Package plant (batch type)
Courtesy of Standard Steel Manufacturing Co., Inc.

use, especially if care is taken to avoid extreme conditions and to rinse equipment after use. Some producers are using aluminum in this way and no serious consequences have been reported. However, opinion in the industry varies widely as to usability of the material.

Inhibitors are quite effective in reducing corrosion but few instances of such use have been found.

Plant Design

Several engineering firms have entered the field in the past two years, bringing with them new developments, and the older firms have continued to improve their designs. New plants continue to be divided between the batch and continuous types, with the batch type in the majority. The degree of instrumentation in some of the newer plants is illustrated in Figure 2 and an automatic, continuous plant is shown in Figure 3. The size of plants—in the central and eastern areas—remains about the same; production capacity normally is about 10 to 15 tons per hour.

A major objective by builders both of batch and continuous plants has been to reduce plant cost by reducing the amount of stainless steel used in construction. This has been accomplished in some designs by mounting a small stainless steel reaction chamber, sometimes an open-ended pipe section, within a mild steel tank. The acid and ammonia react in the stainless steel reactor and spill over or pass through it into the main tank, the acid being completely neutralized before it reaches the mild steel.

There has been somewhat of a trend to use of coolers, even in batch plants. Operating experience has shown that it is difficult to avoid ammonia loss when making high-phosphate grades unless some means of cooling is available. A separate cooler is generally used and solution cycled through it; in some instances, however, a simple spray on the outside of the main reactor is used.

Some of the newer plant designs are of the package type. A typical example of this is shown in Figure 4.

Pesticides

The practice of adding pesticides to liquid mixtures appears to be growing. First attempts by producers to incorporate such materials resulted in difficulties because the pesticide tended to separate from the fertilizer solution. In some cases the resulting congelation caused stoppage of applicators. This problem appears to have been overcome by the pesticide producers, who now supply products which give a stable emulsion in the liquid mixes. Aldrin and heptachlor are the principal pesticides used.

The practice continues of selling the pesticide separately and adding it to the liquid mix after the latter has been measured out and transferred to the tank truck. To some extent this is a way of avoiding the control problem but it is also a convenient way of adding the pesticide. Just as in solid mix production, addition during mixing is not advisable because of the possibility of decomposition, and separate mixing with cooled solution would involve another operation and increase operating expense. All producers reported that normal agitation during hauling is sufficient to disperse and mix the pesticide adequately.

Trace Elements

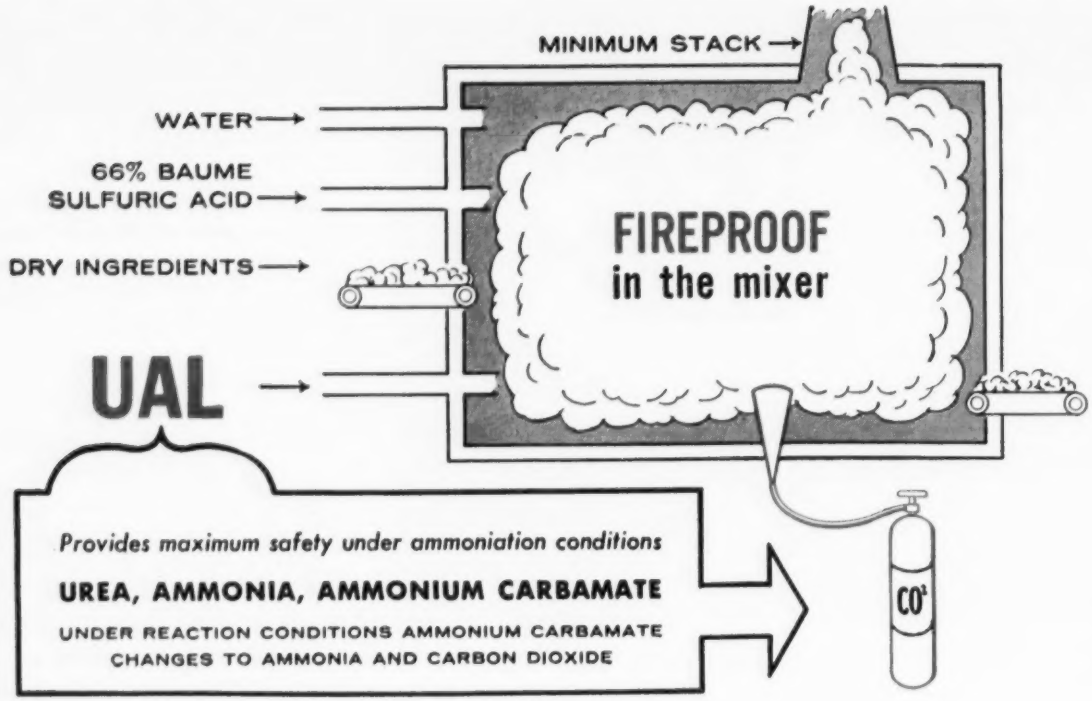
In some sections of the country there is some demand for trace elements in the liquid mixes. Boron, the element most often added, has adequate solubility in the form of compounds now supplied by the borax industry. As much as 5% (borax equivalent) can be dissolved without exceeding acceptable crystallization temperature.

The situation in regard to other trace elements is not so fortunate. Most of them, such as manganese, copper, iron, and zinc, have practically no solubility in neutral liquid mixes when they are in the usual sulfate form. There is some use of chelated forms but these are relatively expensive. No data appear to be available on the solubility of the chelates in liquid mixes.

Recent work at TVA has shown that solubility of trace elements is increased significantly if the phosphate in the liquid mixture is partly in the meta rather than the ortho form. The metaphosphate was supplied by using the reaction product of ammonia and phosphoric oxide as the source of phosphate for the solution. Concentrated phosphoric acid was also tried but the pyrophosphate from this source gave only a small increase in solubility for most of the elements. Iron was an exception, being soluble to as much as 2% (as the oxide). The other metals (dissolved in the acid as the first step) were quite soluble upon ammoniation of the acid but precipitated on long standing. However, the precipitate stayed in suspension quite well and probably would not interfere with application.

Distribution and Application

There appears to be some trend toward more distribution through dealers. Many producers have found that although their trade area is relatively small they need sales assistance in the individual farming communities in the area. The dealer may merely sell and haul the prod-



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uct from plant to consumer. In most cases, however, he has some storage and does custom application.

Custom application is a necessity in introducing liquids into an area but many producers try to get the farmer equipped to apply the product. One of the major reasons for this is the problem of serving all customers adequately on a custom basis during the rush season. Some producers assemble or fabricate application equipment in their own shops and push the sale of it as a means of getting the farmer equipped to apply the product.

There has been considerable development in application equipment. Initially practically all applicators were equipped with pumps but other types are now available. One of the newer types uses the "hose pump" principle, developed originally at the University of Tennessee and later improved by the U. S. Department of Agriculture. In this type (see Fig. 5) rollers pressing against plastic tubes successively squeeze out portions of liquid. Advantages claimed are low cost, lack of corrosion, and avoiding of stoppage from foreign particles of corrosion products in the solution. Gravity flow types of applicators are also growing in popularity (Fig. 6). Various devices are supplied to give uniform flow with varying level in the supply tank. In addition to simplicity and low cost, an advantage claimed is that absence of moving parts eliminates the sticking and need for adjustment often required with other types after long periods of standing idle.

Progress is also being made in adapting planters to application of liquid fertilizers. For example, an attachment for planters is designed to operate off the checking mechanism and deposit a portion of liquid fertilizer adjacent to each seed.

Costs

Considerably more information is available now on costs than was a year or so ago. Stanfield (**7**) has reported estimates to compare the costs of production and distribution with that for solid fertilizers in different parts of the country. The regions selected were the South Atlantic as the least favorable and the Pacific as the most favorable. Many factors affect such a comparison so that it is not possible to draw any general conclusion other than that the economics of solid fertilizers become more favorable as concentration increases and that of the liquids moves into better position as the $N:P_2O_5$ ratio decreases, i.e., as less expensive supplemental nitrogen is used. Under the best conditions for liquids, they were competitive in the Southeast and considerably ahead in the Pacific region. Under the most unfavorable conditions they were behind in both regions.

These estimates were based on use of solid urea as the source of supplemental nitrogen, whereas many producers now use the less expensive urea-ammonium nitrate solution. Substitution of the latter would give the liquids a more favorable position in some of the estimates. Moreover, lower cost of application on the farm is a factor which is important but difficult to evaluate.

Several cost estimates are also available from brochures of engineering and supplier firms. These all show an adequate return for liquid mix production, assuming that the product is sold at the same price as bagged solid fertilizers. However, most of these estimates assume a somewhat higher level of production than the current average.

Agronomic Considerations

Very little agronomic information on the value of liquid mixtures has been available. However, during the past year or so agronomists have turned their attention to the problem and considerable testing is now being done. In greenhouse studies at TVA, yields obtained from liquids were as good, and in some cases slightly superior, to those obtained from solid fertilizers. In these tests the solid fertilizer was water soluble and its water solution was used as the liquid fertilizer. Materials tested were diammonium phosphate, ammonium metaphosphate (reaction product of ammonia and P_2O_5), and ammoniated superphosphoric acid.

Field tests are also being carried out by several university experiment stations around the country. Several such tests were started in the fall of 1956. One completed study has been reported by Mortensen and Kittams (**5**). The general conclusion from this work was that only small differences may be expected between liquid and solid fertilizers on vegetable crops unless affected by method of placement or some other factor.

This study also compared liquid with water-soluble solid fertilizer. In most sales areas, the practical comparison is between liquids and a solid mixed fertilizer which is only partly water soluble, the degree of solubility depending mainly on the amount of ammonia reacted with it

Figure 5. Hose pump type of applicator

Courtesy of Krause Corp., Inc.

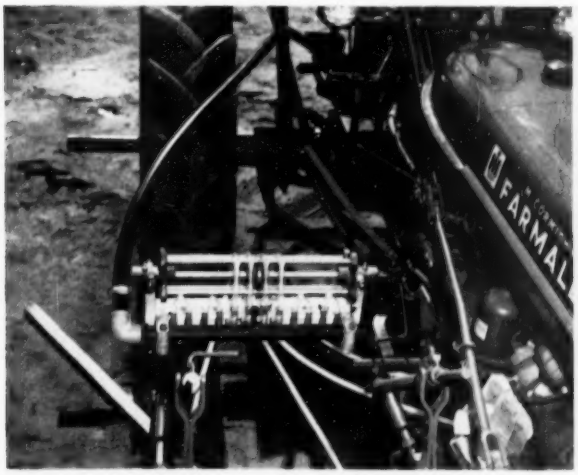

Figure 6. Gravity flow applicator mounted on corn planter

Courtesy of John Deere Planter Works

during production. The value of water solubility varies with soil type and other factors. The agronomic consensus is that most mixed fertilizers have enough water solubility for most soils. However, the rapidly increasing rate of ammoniation in the past few years raises some questions in regard to midwestern soils. Where this is a factor, liquids have the advantage of supplying completely water-soluble phosphate at the same price level—in most areas—as for partially water-soluble solid fertilizers.

A further possible advantage for liquids is in areas periodically subjected to severe drouth conditions. Some producers claim that the already-dissolved state of the liquid mix gives a significant advantage during severe shortages of soil water. As far as is known, this possibility has not been tested conclusively.

Status of the Industry

The liquid mix industry in the central and eastern parts of the country is now out of its infancy and more information is available on which to judge its status and prospects. There is still, however, a relatively high degree of uncertainty as to what place the method will assume in the fertilizer distribution pattern. The liquid mixes do not have the driving force of cost differential between liquid and solid form that is the main advantage of anhydrous ammonia and nitrogen solutions. Liquid producers do well to keep their costs in line with those of solid mix manufacturers. There are factors, however, which may help the liquids to gain some advantage. One of these is the trend to granulation of solid mixtures, with consequent increase in the cost of production. Moreover, an acid is required in granulation and as higher analyses become more popular there may well be a trend to use of phosphoric acid as the source of part of the phosphate. Thus the solid mix industry may approach use of the same raw materials as those used in producing the liquid mixtures. The continual increase in shipping costs is also an important factor, since on the average solids mixtures are shipped farther than the liquids.

As pointed out earlier, the number of plants is likely to continue increasing because of the many areas remaining which should be as appropriate for plant sites as those to which plants have already been attracted. Moreover, the industry appears to be moving into new areas such as the Northeast and Southeast. With the resulting large number of plants, the high production capacity should give the industry a good position for capitalizing on any trend in favor of liquids in the future. Although current average production probably is 1000 to 2000 tons per year, most plants could produce 20,000 or more tons even in a 100-day season—assuming that sufficient equipment were on hand to haul off the product.

Semi-intangible factors such as convenience and labor saving on the farm probably are still the most important factors in favor of the liquids. The degree to which these will counterbalance the disadvantages and the rapidity with which normal customer inertia will be overcome are factors which are difficult to evaluate.

ACKNOWLEDGMENTS

The author appreciates the interest and cooperation of many agronomists, raw material suppliers, producers, and equipment suppliers who made this review possible.

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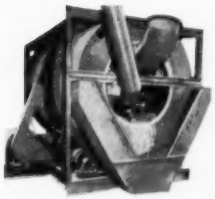
COOP SOIL TESTING

Many moons ago in these pages we discussed the spread of cooperative soil testing laboratories. The May issue of "Farm Families" describes one such set-up in North Texas, at Seymour. It has been operating about a year. It has been recognized officially by Texas A&M. And it is easier for farmers to drop soil samples by the lab in Seymour, when they come in to shop. than to mail to Texas A&M's lab.

$3,000 equipped it. The City contributed the quarters in the municipal building. The County (Baylor) helps pay the lab technician's salary. Now 200 samples a month come in and it is a going, thriving concern . . . some from well outside of Baylor County, too.

Credit for the leadership goes to county agent R. L. McClung, who says several other counties are now contemplating their own lab.

NEW STAR* OF THE SACKETT GRANULATING TEAM



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A performance-proved machine combining the desirable T.V.A. submerged ammoniation design with Sackett time-honored rugged construction. Select the size you need from 15 to 60 tons per hour.

SACKETT STAR* GRANULATOR
This new machine has been called "The Missing Link" so badly needed in granulation. It performs the important job of forming a far greater portion of the initial feed into pellets of acceptable size. Select yours from a complete capacity range from 15 to 60 tons per hour.

The Sackett STAR* Granulator is an entirely new and revolutionary approach to the granulation of fertilizer mixed goods.

Here's what the STAR will give you:

CONTROLLED GRAIN SIZE
New concept of grain size control. Larger percentage thru 6 on 16 mesh range, smaller portions of under and oversize.

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Up to fifty percent increase in product recovery, because of its inherent, vigorous rolling—*not sliding*—action.

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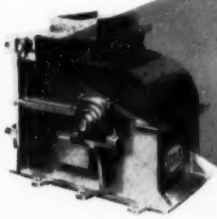
More granulation the first time through, means substantially higher production capacity.

LOWER DRYING COST
Higher percentage of on-size in initial granulation means less fuel cost per ton due to lower hydration of total feed.



SACKETT BAR MILLS
This is the first mill, to our knowledge, that has been designed specially for use in *cracking* . . . not pulverizing . . . the granular oversize from the final product classifying screen. Its gentle impact action on the material accomplishes desired size reduction with minimum formation of fines.

Established Fertilizer producers are invited to get our up-to-the-minute counsel on their conversion and expansion programs. It is available without cost.

OTHER SACKETT PRODUCTS

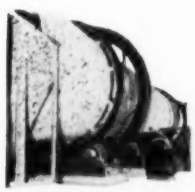
Batch Weigh Systems

Mixing and Shipping Units

Materials Handling Equipment

Superphosphate Manufacturing Processes

*U. S. and Foreign Patents Pending



SACKETT COOLERS
No other manufacturer offers such a complete selection of sizes and capacities. Rugged construction and highly efficient dust control are two of their noteworthy features. Infinite number of diameter and length combinations assure you of just the right one for your capacity and space requirements.

SACKET DRYERS
These highly efficient direct heat gas or oil-fired units are built to give many years of service in spite of the severe conditions under which they must operate. Unique tuyere design combustion chamber assures reduced chemical losses and maintenance costs. Built in sizes to meet every capacity requirement.

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SAFETY....

EXECUTIVE COMMITTEE MEETS

The mid-year meeting of the Executive Committee of the Fertilizer Section of the National Safety Council was held in Richmond, Va., June 7, in the board room of the Southern States Cooperative Building. Nineteen members of the committee were present. E. O. Burroughs, Jr., F. S. Royster Guano Co., is chairman of the group.

Reports were given pertaining to the safety contest sponsored by the Council. As of February, 1957 there were 169 contestants in the contest, with an accident frequency rate of 10.24. This compared to a frequency of 10.59 for the same month in the year of 1956. (The lower the rate, the better the record.)

A letter of invitation to join the safety contest was mailed to companies now participating.

The Engineering Committee report pointed out that the committee was preparing material for use in the form of safety instruction cards, covering valve check operations, conveyor belt operation, sewing, mixer operation, tractors (care and operation), blasting, superphosphate den operation, acid concentration, and triple mixing.

Curtis Cox, Chairman of the Membership Committee reported that the Fertilizer Section had a membership of 104 as of June 15. Mr. Cox indicated that the committee has plans for stepping up the membership drive during the remainder of the 1957 year.

The supervisory training committee reported that plans were in process for another training course to be held in Wilmington, N. C., probably later this summer.

It was also reported that a training course will be held in New York State during 1958 with the concurrence of Cornell University.

Fertilizer Safety Section Program Announced

NATIONAL SAFETY CONGRESS, FERTILIZER SECTION, OCTOBER 21 and 22, 1957
La Salle Hotel, Chicago, Ill.

Monday, October 21

2:00 P.M. Opening Remarks by General Chairman
2:10 P.M. Election of 1957-58 Officers
2:20 P.M. "Front Office Safety" by Frank A. Gerard, Safety Manager, Olin Mathieson Chemical Corp.
3:00 P.M. "Safety—A Retreat or a Challenge" by John H. Foulger, M.D., Director of Medical Research, E.I. Du Pont De Nemours & Co.
3:40 P.M. Discussion.
3:50 P.M. "How We Can Profit From Thorough Accident Investigation" by James E. Kavanaugh, Supervising Engineer, Engineering and Loss Control Division, The Travelers Insurance Company.
4:25 P.M. Discussion.

Tuesday, October 22

Presiding: General Chairman Elect.
12:00 Noon Luncheon—Speaker T. J. Clarke, Controller, Cooperative G.L.F. Exchange, Soil Building Division; Topic: "The Man Who Wasn't There."
2:00 P.M. Announcements.
2:10 P.M. "Visualizing Ammonia Hazards." by E. V. Anderson, Safety Engineer of Johnson and Higgins.
2:40 P.M. Discussion.
2:50 P.M. "Using Acids and Nitrogen Solutions Without Hazard—Carlessness Can Be Costly." by Elmer Perrine, Technical Representative, Nitrogen Division, Allied Chemical & Dye Corp.
3:35 P.M. Discussion.
3:50 P.M. "Observations On Latin American Safety," by A. B. Pettit, Director, Industrial Health and Safety, W. R. Grace & Company.

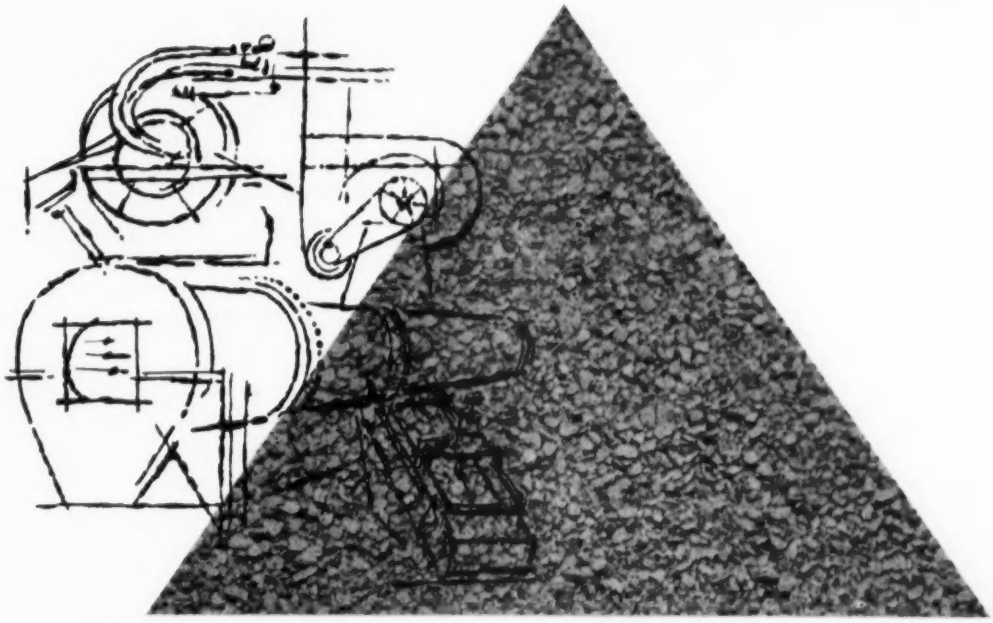
Ammonium Nitrate-Sulfuric Acid Reaction Warning From NPFI

The following is a precautionary warning to all mixers using large quantities of ammonium nitrate solutions in formulation of mixed goods along with substantial amounts of 66° Be sulfuric acid. Swift & Co. has found evidence that large, hot lumps which occasionally form and discharge from the mixer may be extremely dangerous if allowed to go into the piled mixed goods without being cooled.

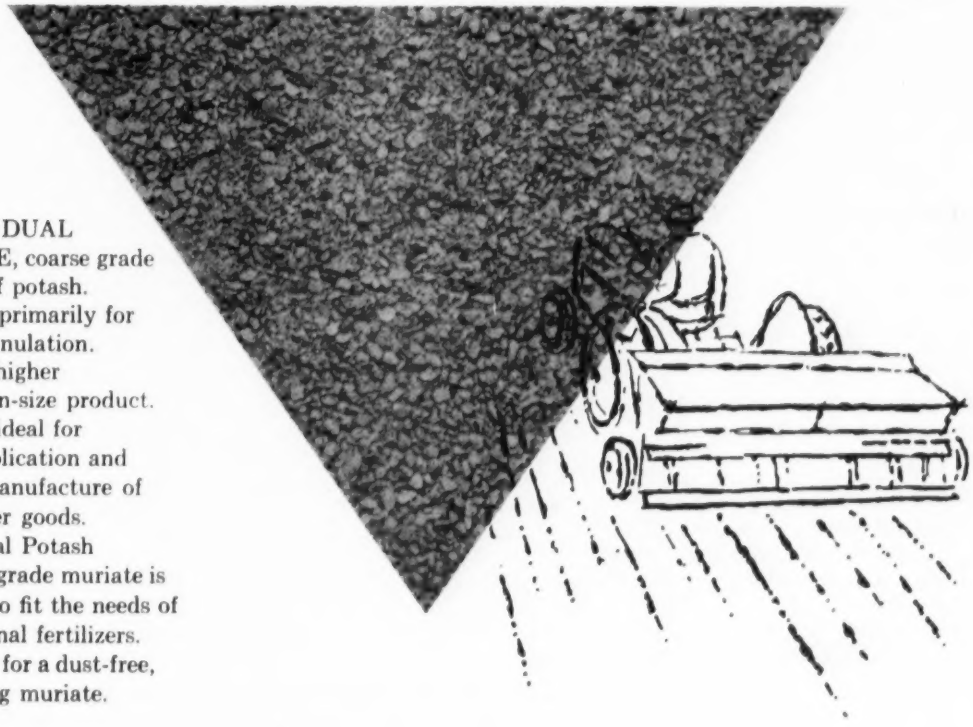
A recent unscheduled shutdown during production of a 12-12-12 grade with 421 pounds of nitrogen solution and 256 pounds of 66° Be (93 percent) sulfuric acid and 33 pounds of anhydrous ammonia per ton of mixed goods necessitated dumping the mixer contents on to a separate pile immediately after shutdown and, therefore, by-passed the normal cooling operation. This small pile soon began to evolve dense white fumes and gave evidence of spontaneously reacting throughout the entire mass. A temperature check indicated the heat generation had brought portions of the pile up to over 500° F. The reaction was brought under control in about 30 minutes after the pile had been thoroughly broken up, spread with dolomite and flooded with water.

A recheck of operations, after starting up, indicated that occasionally a few lumps would come out of the mixer which were extremely hot and evolving white dense fumes. A coarse grid was installed at the mixer discharge to separate these from the freshly mixed goods going to the cooler.

Laboratory studies were then carried out which indicated that fertilizer salts promote the rapid breakdown of ammonium nitrate when heated. Such mixtures, when heated to 420° F, begin a slow decomposition of the ammonium nitrate which eventually is destroyed. Moreover, when a mixture contains about six percent or more of ammonium nitrate and is heated to 450° F, the breakdown becomes extremely rapid and is self-sustaining. A large temperature increase in the product results from this fast decomposition. Hence, in order to avoid the possibility of generating a self-sustaining reaction within a pile of freshly made goods, it is evident that no



LET NATIONAL POTASH SERVE YOU



Here is a DUAL PURPOSE, coarse grade muriate of potash. Designed primarily for use in granulation. It gives a higher yield of on-size product. It is also ideal for direct application and for the manufacture of top dresser goods.

National Potash standard grade muriate is designed to fit the needs of conventional fertilizers. Processed for a dust-free, non-caking muriate.

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extremely high temperature lumps should ever be allowed to become submerged in mixed goods with a large percentage of ammonium nitrate. Conservative calculations indicate that a six inch diameter lump which has undergone the spontaneous reaction requires a minimum of 10 minutes to cool to 400°F on exposure to usual ambient air flow in rotary coolers.

This experience at Swift & Co. and its laboratory studies emphasize that (1) no large, hot lumps of high solution mixtures should ever be allowed to reach the storage pile, (2) solution, acid and dry solids fed to the mixer should be kept within reasonable balance at all times, (3) localized over-heating in the mixers should be avoided, (4) large, hot lumps must be diverted by grids to prevent them from reaching the storage section, and (5) temperature levels above 450°F can initiate a dangerous spontaneous reaction in fertilizer mixtures having six percent or more ammonium nitrate.

*The above was released to us by the National Plant Food Institute and is being printed here as a public service to the fertilizer industry.

Gornto Becomes Consultant On Safety And Insurance

Vernon S. Gornto, one of the prime factors behind the success of the Fertilizer Section, National Safety Council, has announced his entry into the field of insurance and safety consultation on August 1, at which time he was retired as safety director and manager of the insurance department by Smith-Douglass Co., Inc., Norfolk.

The safety and insurance program developed under his guidance for Smith-Douglass and its subsidiary firms is reputed to be one of the best in the nation, and has resulted in an annual saving of $110,000 on the company's insurance premiums, according to Mr. Gornto.

The new firm, organized last year, which Mr. Gornto will head is Insurance Unlimited, 323-325 Kresge Bldg., 230 Granby St., Norfolk, Va. In addition to directing the operations of the general insurance office, he will specialize as an insurance consultant for fertilizer manufacturers.

In addition to Mr. Gornto's active interest in the Fertilizer Section of the National Safety Council, he has had a major role in organizing regional and state safety groups in the fertilizer industry.

A charter member of the national Fertilizer Section, he has served as its secretary, vice-chairman and general chairman, and currently is chairman of the Legislative and Insurance Committee.

He was also a charter member of the Fertilizer Section, Virginia Safety Association, organized in 1947, and presently serves as general chairman for this body.

Mr. Gornto organized the Safety Sections of both the North Carolina and the South Carolina State Safety Conferences, and is former general chairman of both sections. In 1953 he organized the Fertilizer Section of the Southern Safety Conference, and served two years as general chairman.

Vernon S. Gornto

He is a charter member and former vice president of both the American Society of Personnel Administration and the American Society of Insurance Management, and presently is on the Board of the Virginia-Carolina chapter of the latter organization.

PIERCE WINS AWARD

The Pierce Fertilizer Works, Pierce, Florida, was presented with an award by the Florida Safety Department for completing 3 years without lost time as a result of injury. Pierce is a subsidary of American Agricultural Chemical.

"PRACTICAL" RESEARCH BUDGET

The American Institute of Management reports a study on research and says the practical minimum budget for a small business to have its own research is $120,000 a year, plus $50,000 initial outlay. This presupposes a need for five scientists. AIM has also made a list of good research foundations and labs who will take on your work.

IM&C AWARDS

Four year scholarships to the colleges of their choice were recently awarded a Minnesota high school boy and a South Carolina high school girl by the plant food division of International Minerals and Chemical. These are children of employees. One year scholarships went to four other outstanding students—outstanding in 4H, FFA and other leadership activities.

IM&C GETS AD HONOR

At a recent dinner of the Chicago Federated Advertising Club, Frank O'Neill, ad manager, and Bill Dibble, product salesmanager for the potash division of International Minerals and Chemical were honored for "the best farm paper product - selling campaign in color."

DEAD SEA REVIVING

The Government of Jordan is offering concessions to US investors for development of potash and other mineral deposits from the Dead Sea. Ask the Investment Development Division, Bureau of Foreign Commerce, Washington, or The Minister of Economy, Amman, Jordan.

COUNCIL MEMBERSHIP PAYS OFF

Workers employed by member companies of the National Safety Council had fewer injuries in 1956, and the ones they had were less severe.

Th average injury frequency rate for employees of all industries submitting company reports to the Council—based on the number of disabling injuries per one million man-hours—was 6.38 in 1956, a reduction of 8 per cent from the previous year. It was the second time that the all-industry rate was less than 7. The Chemical Industry members showed a 10% drop from their 1955 frequency rate of 3.38 and a 24% drop in severity rate of 462.

ARIZONA

Southwestern Agrochemical Corp. expect to start operations early this month with their new 60 daily ton sulphuric acid plant at Chandler. The plant is a small unit specifically designed for small manufacturers by **The D. M. Weatherly Company.**

CALIFORNIA

Best Fertilizer last month announced plans for a $4,000,000 ammonia plant to be built at Lathrop, near its present plant there. Construction is to start this month, with completion slated for September of next year, according to president **Lowell Berry.** The plant is owned jointly by Best and the **California Ammonia Company** which in turn is owned by 500 farmer nitrogen users. Production should reach as much as 30,000 annual tons of ammonia, with **Julian Rogers** as plant manager. It will be a push-button operation with not more than three operating men per shift.

ILLINOIS

Illinois Farm Supply, East St. Louis, shut down for conversion to a calcium metaphosphate granular operation when the season ended last month. The operation is based on a development by their own chemist, James Seymour, at their Collinsville laboratory. It is reported to boost the water-soluble phosphates, to make more uniform granule content, and requires only one third the normal sulphuric acid.

This process, on which the coop has applied for patents, will be supplied with calcium metaphosphate from the $7,500,000 electric furnace several coops are jointly building in southeast Idaho, which heretofore—the Illinois people report—has been made in commercial quantities only by TVA.

INDIANA

Green Belt Chemical Co. has selected Jay county, north of Portland, as headquarters for a new plant.

Construction is about to start on the 26,000 square foot agricultural chemical and plant food warehouse. The new plant will be wood and steel construction and when completed be approximately 222 feet long and 130 feet wide. Contracts have been let for the equipment and building.

Green Belt Chemical of Indiana is a new firm capitalized at $250,000.

KENTUCKY

TVA superphosphoric acid (105% H_3PO_4; 76% P_2O_5) was successfully ammoniated in a commercial ammoniation reactor at **West Kentucky Liquid Fertilizer Corp.,** Hopkinsville, during June in a demonstration to establish the practicability and economy of formulating such liquid grades as 11-33-0, 10-10-10 and 7-21-7 with the new material.

This is the first successful ammoniation of the new concentrated acid in a commercial ammoniation reactor according to **J. C. Carlile Corp.** of Denver, designers of the equipment, who state that this development will help liquid producers to compete—cost-wise—with solid fertilizer mixers in many areas.

Assisting in the testing at Hopkinsville were **Don Humphrey** and **Norman Dean Godden** of **Flo-Lizer Co.,** Kingston, Ohio, along with **Morris T. Wousley** and his West Kentucky staff. TVA's process chemical division staff, of course, also lent a hand.

Further development work on use of wet-process acids in liquid formulation is being carried out at the Hopkinsville plant.

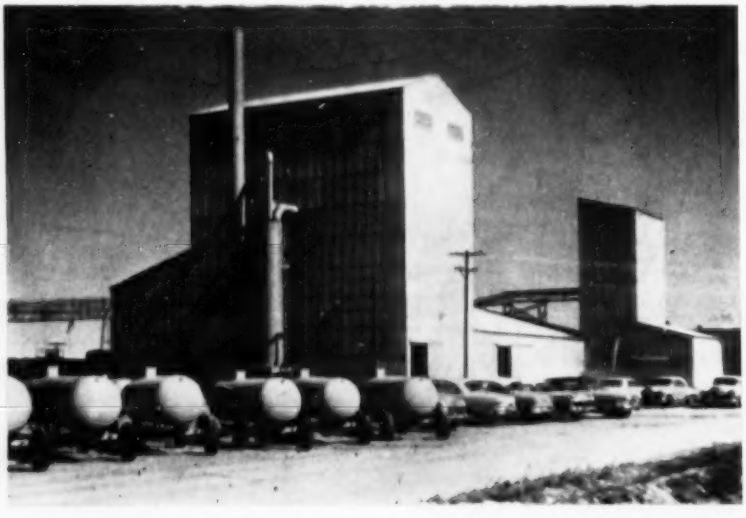
MISSISSIPPI

Spencer Chemical has announced that production of urea is now underway at the Company's Vicksburg Works which was just recently expanded to include the new product. **J. C. Denton,** vice president, agricultural chemicals, said that the new facilities are relatively small, having a capacity for only 10,000 tons per year. The cost of the new installation was not disclosed.

The production of urea will complement other nitrogen compounds produced at the Vicksburg Works, Mr. Denton said. The urea will be used to formulate nitrogen solutions distributed to manufacturers of mixed fertilizers.

The urea is manufactured from ammonia and carbon dioxide, both of which were already available from existing plant facilities. There will be no increase in ammonia ca-

Operation of Southwest Chemical Corporation's complex fertilizer plant at Chandler, Arizona, has begun utilizing the Weatherly "Dia-Phos" process. The plant was designed by The D. M. Weatherly Co., of Atlanta, Ga. and equipment was fabricated by J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kans. Utah Construction Co. of San Francisco handled the construction.



pacity as a result of the new product. Spencer obtained the urea process under license agreement with **Montecatini.**

One of the nation's largest nitrogen producers, Spencer constructed the Vicksburg Works in 1954 to produce ammonia and nitrogen solutions. In addition the company operates nitrogen plants at Henderson, Kentucky, and Pittsburg, Kansas.

* * *

Mississippi Chemical, via Owen Cooper, executive vice-president, has announced the awarding of a contract to **The Chemical and Industrial Corporation,** Cincinnati, for the design and construction of a 150 daily ton nitric acid plant, to be located at their existing Yazoo City facilities. This is the fifth nitric acid unit of the high pressure design which has been installed by Mississippi Chemical.

MISSOURI

Atlas Powder Company will replace the nitric acid and ammonium nitrate facilities at its Atlas Plant during the next nine months at a total cost of approximately $4,000,000. Atlas President **Ralph K. Gottshall** has announced at company headquarters in Wilmington, Del.

Work on installing the new, modern units will begin immediately, and they are expected to be in operation by March 1, 1958.

Commenting on the announcement, **D. J. Carroll Copps,** senior vice president in charge of the company's explosives division, said: "We have been hard-pressed for some time to produce enough nitric acid and ammonium nitrate to meet our internal company needs. These new units not only will enable us to meet our own immediate needs more efficiently, but also will provide additional capacity that will permit us to offer some of our products for sale to industrial consumers."

The new acid plant will be one of the so-called "self-sustaining" type and the first of its kind to be erected in this country, according to the contractor. Once the plant is started up, the energy released from the burning of ammonia is recovered to the extent that it provides the full power requirements of the unit when operating under design conditions.

The Chemical and Industrial Corp., of Cincinnati, has been granted the contract for the design and construction of the acid unit.

OREGON

Cooperative Oil and Supply and **Pacific Supply Cooperative** recently held a liquid fertilizer field demonstration, followed by a question and answer period to which came some 70 Wasco County growers and FFA members. Active in staging this event were **Glenn Bates** of COS and **Karl Baur** of Pacific. A dinner meeting concluded the affair.

UTAH

U. S. Steel has formally opened its new Geneva Works at Provo, which, as our readers know, uses **Montecatini** processes to produce nitrogen products from hydrogen from US Steel's nearby coke ovens. Some of the nitrogen is to be converted to nitric acid, from which ammonium nitrate will be produced. This is said to be the first plant of its kind in a major steel plant in the US, and was engineered and built by **Blaw-Knox.** Top officials of both concerns and other distinguished guests were present at the opening.

WASHINGTON

Phillips Pacific Chemical has in complete operation the Coulee plant near Kennewick, owned jointly by **Phillips** and **Pacific Northwest Pipeline.** Completed in May, it is now in full production, turning out ammonia at the rate of 200 daily tons from natural gas.

WYOMING

San Francisco Chemical is in operation at Leefe with its new wet concentration process plant for phosphate ores, which will permit marketing of low-grade western ore in competition with high-yield eastern ores. Credit for development of the process is given to the **Colorado School of Mines.** The company is planning another conversion plant which will incorporate improvements in their fluo-solids or ore roasting process.

* * *

Davison Chemical and **Union Pacific Coal** are conducting near Casper a survey to explore the possibility of a sulphuric acid plant there.

AUSTRIA

Austrian Nitrogen Works of Linz and **Montecatini** have made an agreement for common efforts in the development of a petrochemical industry in Austria. Linz holds 51%.

CANADA

Northwest Nitro Chemicals, Medecine Hat, have announced, via their president, **Tom L. Brook,** plans to make a $150,000 expansion which will permit four new phosphate nitrate formulations. Mr. Brook says the $22,000,000 operation is still running behind sales demand.

INDIA

Burmah-Shell and the Government have resumed negotiations over the matter of refinery gas for the production of fertilizers in Bombay.

* * *

Singmaster & Breyer, prime contractors on the DDT plant at Alwaye, Southern India, have chosen **Sturtevant Mill Company** to supply fine-grinding equipment, after tests were made on Indian inert materials in the Sturtevant fine-grinding pilot plant in Boston. The focal point of the formulating plant is to be a 24-inch Sturtevant micronizer, and the grouping will include a preliminary grinder, mixing and blending equipment, collecting and packaging equipment. A compressor and chilling unit will be used in the micronizer, due to the high temperatures in India. This is all being engineered and supplied by Sturtevant.

The new plant is located nearby **Fertilizers and Chemicals Travancore,** also an S&B engineered project, which will supply raw materials. The DDT plant will produce 4 daily tons of technical grade.

ITALY

Societa Azienda Nationale Idrogenazinone Combustibili, Milan, has awarded to **Potasse & Engrais Chimiques** contract for a 400-600 T/D complex fertilizer plant using the PEC carbonitric process, which will produce a basic formula of 13-10-12.

This is of the type plant available in the US exclusively through **The Chemical and Industrial Corporation,** Cincinnati, and is exemplified by the plant in operation since 1956 completed for **California Spray-Chemical** which is presently producing a 15-15-15 and 22-22-0.

PAKISTAN

Pak-American fertilizer plant at Daudkhel is in production, after being in construction since 1952. In that year Pakistan's fertilizer requirements were 10,000 tons. By 1955 this had climbed to 50,000 tons, and has risen to nearly 150,000 annual tons. Hence, in addition to the Pak-American production, Pakistan will be spending more than 8½ crore ru-

pees during the current fiscal year to supply the growing market.

SPAIN

Cia. Espanola de Petroleos and **Industrias Quimicas Canarias** have not yet announced a site for their proposed nitrogen fertilizer plant which is to have a capacity of 110,000 annual tons of ammonium sulfate, and will cost around $15,000,000.

PERSIA

Montecatini have been asked to study the industrial development of Khurzitan by the concern responsible for the planning — **Lilienthal and Clapp.** The study is to be considered in relation to those of **Union Chemique Belge** who are studying the possibility of setting up a natural gas fertilizer operation.

SHELL-FISONS $30,000,000 PLANT READY LATE 1958

by F. C. Livingstone

As our readers know, who follow "Around The Map," two of the biggest companies in the fertilizer field in Europe are combining their resources and know-how to develop two new plants side by side at Shell Haven, England, at a total cost of nearly 30 million dollars. The companies are Shell Petroleum Company and Fisons Ltd., and their two plants are expected to be in production by the end of 1958.

The plant the Shell Company is building is to produce ammonia, nitric acid and a granulated fertilizer of the ammonium nitrate/chalk type to be called "Nitra-Shell." The systems of production will be the natural development of methods and ideas perfected in the past 25 years, with the experience the Shell scientists have acquired in producing ammonia at Shell Point, Cal., where the hydrogen required is obtained by the pyrolysis of natural gas. Co-related to this American experience will be that which the Shell Company has acquired in the field of agricultural chemicals in Britain, since the early '30s.

Another source of experience to Shell's scientists has come from the U.S., where the company's ammonia producing plant at Ventura, Cal., has been in operation since 1953 and where the principle of using high pressure steam is employed for reforming natural gas and where some of the resulting ammonia is now being converted into urea.

Shell has experimented widely in the production of ammonia and nitrogeneous fertilizers. One of its principal experimental plants is at Ijmuiden, in the Netherlands, where MEKOG (Maatschappij tot Exploitatie van Kooksovengassen)—a Shell subsidiary—originally produced ammonia based on coke oven gas. In more recent years other methods have been introduced at this plant and the ammonia now produced there is based on water gas and fuel oil gasification as well as by the coke oven gas method. Some of the ammonia produced at Ijmuiden is further processed to nitric acid, thence into several nitrogenous end products.

The Shell Haven plant will devote a substantial section to production of ammonia, nitric acid and a variety of fertilizer end products. The production of ammonia at this plant will involve a new process recently developed by Shell, based on fuel oil gasification. This is a partial combustion process operated under pressure and using oxygen or oxygen-enriched air, by which any feedstock ranging from gaseous hydrocarbons to the heaviest fuel oil can be converted into crude synthesis gas containing a high percentage of hydrogen and carbon monoxide.

Novel features of this process include the efficient recovery of waste heat from the gas by way of high pressure steam generation and the removal from the synthesis gas of a small quantity of carbon in a form which makes it suitable for further use. The first unit employing this process came into successful operation at Ijmuiden in December, 1956.

Use of this process at Shell Haven, will ensure that the production of ammonia will be based on the most economic feedstock regardless of which petroleum fractions are most cheaply available at the refinery from time to time.

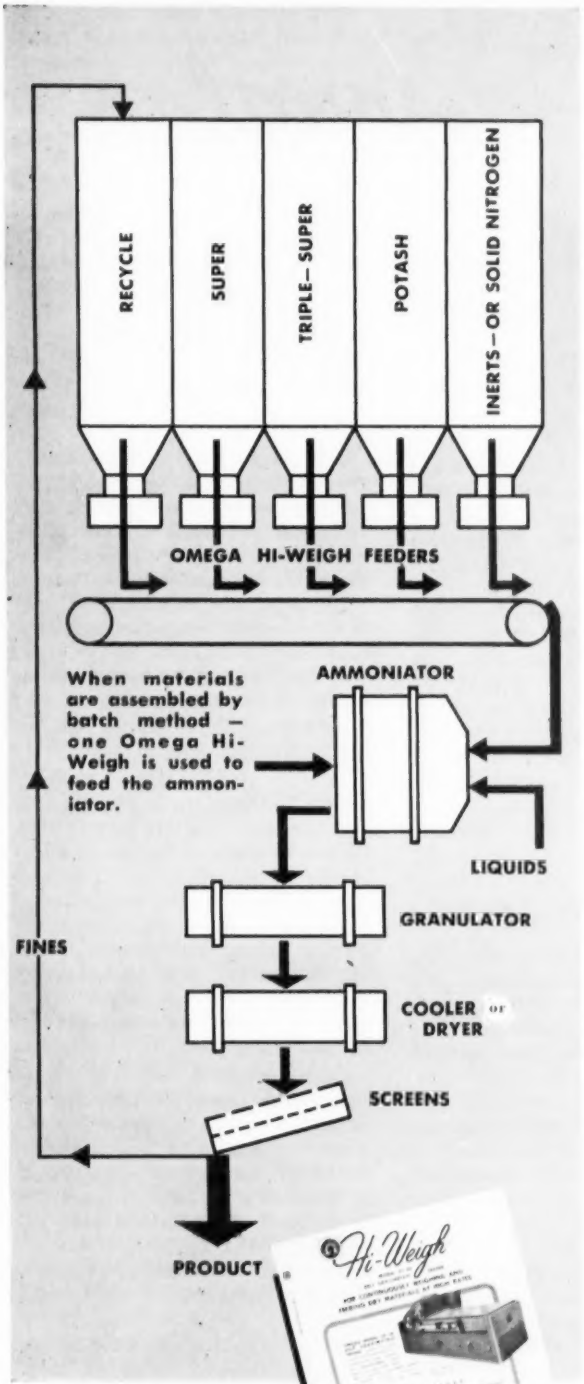
The remainder of the ammonia plant will be of more conventional design and will include units for the removal of hydrogen sulphide by the Shell phosphate process, for the shift conversion of carbon monoxide to hydrogen, for the removal of carbon dioxide by the hot potassium carbonate process, for the final purification of the synthesis gas by a wash with liquid nitrogen, and for the synthesis of ammonia.

Some of the ammonia will be further processed to nitric acid. After making a study of the economics of operating under various conditions, it was decided that a plant operating at medium pressure, producing an acid of about 57 percent concentration, would be the one most suited to plant conditions.

For the production of "Nitra-Shell," the first step is to produce a highly concentrated slurry of ammonium nitrate by the neutralization of nitric acid with gaseous ammonia. Powdered chalk is then added to the slurry after which the mixture enters the granulating drums. The last stage is sieving, so as to ensure the production of a material having the right size range, followed by cooling. By maintaining the ratio of ammonium nitrate to chalk at about 59: 41, a material is produced which is really a physical mixture of ammonium nitrate and chalk and which has a nitrogen content of at least 20.5 percent.

The Shell Haven fertilizer plant is not due to start up until towards the end of 1958 but in the meantime the British market for the product is being developed by importing an ammonium nitrate/lime fertilizer with a minimum nitrogen content of 20.5 percent from the Netherlands. The acceptance of this material in the United Kingdom has been encouraging and it is expected that there will be little difficulty in disposing of the full output of the plant at Shell Haven when it starts operation.

Apart from the production of "Nitra-Shell," a substantial part of the ammonia to be produced at Shell Haven will be sold to Fisons, Ltd., one of the largest firms of agricultural chemists in Britain, who are erecting a fertilizer plant on an adjacent site at an estimated total capital cost of 12 million dollars. It is expected that both the Shell and the Fisons plants will come into production at approximately the same time.



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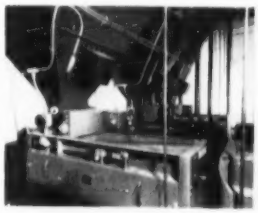
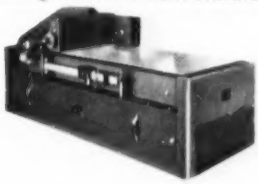


Here's why the Omega Hi-Weigh has been chosen by so many leading fertilizer formulators:



High Capacity — feed rates of over 3,000 lbs. per min.

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Personals

McConnell

James A. McConnell has been elected a director of **Commercial Solvents Corporation**, it was announced by **J. Albert Woods**, president. Mr. McConnell is a director of the Lehigh Valley Railroad, the Farm Foundation and is chairman of the board of the Foundation for American Agriculture. He recently resigned as U. S. Assistant Secretary of Agriculture to accept a professorship of Agricultural Industry in the Graduate School of Business Administration at Cornell University, Ithaca, New York. For many years Mr. McConnell was associated with the **Cooperative G. L. F. Exchange, Inc.**, as general manager and later as executive vice president.

James McInnes, Jr. has been named manager of the New York district sales office, according to an announcement by **James V. O'Leary**, general sales manager. Mr. McInnes takes over the post previously held by **Arthur W. Luedeke**, who will head the company's new mid-Atlantic office with headquarters at Newark, New Jersey.

* * *

The American Agricultural Chemical Company has announced the following sales and production organization changes:

R. L. Waring, Jr., formerly manager of Baltimore sales has become responsible for all phases of fertilizer sales operations as manager, fertilizer sales, for the firm's New York office.

J. H. Brown, formerly sales manager at Alexandria, Va., has become sales manager at Baltimore, Md. **C. I. Mothershead**, formerly assistant sales manager at Baltimore, becomes responsible for sales as manager at Alexandria.

Everett B. Stalnaker, Jr., assistant manager of sales at Buffalo, N. Y., has been transferred to a similar post at Baltimore.

N. E. Edwards, formerly sales manager at Norfolk, Va., is now responsible for sales as assistant manager of specialty fertilizer at the New York office. **H. D. Coulter**, formerly assistant manager of sales at Greensboro, N. C. becomes sales manager at Norfolk.

D. A. Brogan, formerly salesman and sales supervisor for the specialty fertilizer division at Carteret, N. J., has become sales supervisor for specialty fertilizer sales, New York.

E. W. Sale, formerly superintendent at Detroit, Mich., has joined the chemical department at Detroit. **J. A. Layton**, formerly of the New York production department becomes responsible for production as superintendent of the Detroit works.

H. C. MacKinnon, formerly superintendent of production at the Saginaw, Mich. works, becomes responsible for production as assistant superintendent at Carteret. **R. L. Etheridge**, formerly assistant superintendent at the Cleveland, O. works, has become responsible for production as superintendent at the Saginaw plant.

* * *

Blaw-Knox Company, chemical plants division, Pittsburgh, has promoted **William W. Lawrence** to manager of the general chemicals department. In his new position Mr. Lawrence will be responsible for customer relations, sales, execution and development of the comprehensive services of the Division in the engineering and construction of processing plants for the general chemicals field.

* * *

T. M. Martin, president and general manager of the **Lion Oil** division of **Monsanto Chemical Company**, has announced that **H. Harold Bible** became vice president and assistant general manager of the division effective August 1. Mr. Bible joined Lion at El Dorado in March, 1942.

* * *

Wilson Meyer, president of **Wilson & Geo. Meyer & Co.**, has had conferred on him by the Future Farmers of America the Honorary Degree of State Farmer in recognition of his outstanding work for farm youth.

John Foster, Salt Lake manager of Wilson & Geo. Meyer & Co. has resigned and will be replaced by **Thomas Cushing**, now in the San Francisco office of the company.

* * *

R. P. Kessler's appointment as director of research and development for **Arkell and Smiths** has just been announced by **S. S. Yates**, president and chairman of the board.

Mr. Kessler has been packaging engineer and director of packaging research over the last eleven years with A & S.

* * *

Martin L. Rice and **Robert W. Rech** have been named technical sales representatives for the northeast agricultural chemicals division of **Stauffer Chemical Company**, according to an announcement by **Daniel J. Keating**, vice president, agricultural chemicals division.

* * *

Alfred T. Zodda has been appointed vice president-operations for **Olin Mathieson International Corporation, Henry Arnold**, president, has announced.

Mr. Zodda, who will be responsible for all overseas operations of the corporation, had been general manager of **Squibb International** division, **Olin Mathieson Chemical Corporation.**

* * *

Dr. Roy C. Lipps, an authority on soil fertility, has been appointed market development representative for **United States Steel** and assigned to the western sales offices of the **U. S. Steel coal chemical sales division** in Salt Lake City, it was announced by **R. C. Myers**, director of market development.

* * *

Balfour, Guthrie & Co., Limited announce the retirement of **Dr. R. E. Neidig**, vice-president in charge of the fertilizer division. Dr. Neidig will be succeeded by **H. E. Ferguson** who has been appointed vice-president effective July 1.

* * *

Raymond C. Dosta, former assistant treasurer of the **United States Borax & Chemical Corporation**, has been promoted to treasurer, succeeding **R. F. Steel**, it is announced by **James M. Gerstley**, president. It is a posi-

tion that Mr. Dosta has been filling since Mr. Steel's appointment several weeks ago to the newly-created post of assistant general manager.

* * *

The appointment of **Dr. Vern L. Marble** as a **California Spray-Chemical Corporation** district agronomist has been announced by **Leo R. Gardner,** Calspray's manager of research and development.

Dr. Marble, who will join the research staff at Calspray's Fresno office, is filling one of the new positions created by the continued expansion of Calspray's fertilizer program in the San Joaquin Valley.

* * *

Announcements from the **Frank G. Hough Co. include:** Vice-President **T. F. Flood** has been elected to the board and given additional responsibilities in charge of sales and manufacturing. He started with them in 1945. **Jules C. Laegeler,** with them since 1951 has been made chief engineer. **T. G. Granryd** succeeds him as manager of the product improvement department. **Robert L. Smith** has been elected secretary and treasurer. **Frank M. Docauer** is now assistant secretary. **Fenton O. Richards** is controller.

* * *

James H. Charles has been named successor to **V. H. Hair,** general credit manager of **Armour Fertilizer,** retired after nearly 45 years of service.

* * *

James P. Margeson has retired as director and executive vice-president, **International Minerals & Chemical.**

* * *

Frank A. Ernst, Nitrogen Division manager at Hopewell has been named an honorary member of the Hopewell Rotary Club. President of the Virginia Chamber of Commerce, Mr. Ernst is the first non-Rotarian to receive this honor from the local club. Mr. Ernst, now 65, will retire this month after 30 years with **Allied Chemical and Dye** or its affiliates.

* * *

Lloyd C. Mitchell, FDA research chemist, has been given the Harvey W. Wiley Award by the Assn. of Official Agricultural Chemists.

* * *

Dr. W. B. Andrews has resigned his position as agronomist at **Mississippi State College** to accept the position as technical sales director with **Mississippi Chemical Corporation** and **Coastal Chemical Corporation,** Yazoo City, Mississippi.

Dr. Andrews has been associated

W. B. Andrews

with the Mississippi State College and the Mississippi Agricultural Experiment Station since his graduation from Mississippi State College with a master's degree in 1931 except for two years of graduate study at Michigan State College when he received his doctor's degree. One of Dr. Andrews' most notable accomplishments has been in the direct application of anhydrous ammonia. He is generally recognized as the "father" of modern methods of applying nitrogen to the soil as anhydrous ammonia. This work began in 1943 and in 1947 was released to the farmers. Since that time the use of anhydrous ammonia as a fertilizer has grown to where in 1956 approximately 500,000 tons were used for direct application representing a fertilizer value of 62,500,000 and a plant investment to produce the anhydrous ammonia of $75,000,000.

* * *

Appointment of **J. A. White, Jr.,** as manager of the **Chase Bag Company** branch in Dallas, Texas, has been announced by **W. N. Brock,** vice president and general sales manager of the multi-plant packaging firm.

Mr. White was formerly in charge of the Chase sales office in Richmond, Virginia. He has been succeeded there by **Floyd W. Clark,** a sales representative in the Richmond territory during the past five years.

Willard A. Ashburn, Norfolk practicing attorney before joining executive management of **Smith-Douglass Co.** in 1953, was elected the company's president and chief executive officer July 16.

Ralph B. Douglass, whom Mr. Ashburn succeeds as president, was named to the new office of chairman of the board, with responsibility for general supervision of the company. Mr. Douglass reached retirement age last year, and the new position was created at his request. Both changes were effective August 1.

At the same meeting, the company's Board named **J. T. Dineen** a partner in **F. Eberstadt & Co.,** New York investment firm, as director to fill an existing vacancy.

Smith-Douglass operates eleven plants in ten cities, and recently acquired **Texas City Chemicals, Inc.,** a multi-million dollar chemical plant in the Galveston-Houston area.

* * *

Augustus C. Long, chairman of the board of directors of **The Texas Company,** has announced the election of **L. C. Kemp, Jr.,** as vice president in charge of Texaco's petrochemical department.

Mr. Kemp previously served as general manager of the department. He joined the Texas Company in 1929.

* * *

Glenn Sample, chairman of **Farm-City Week** for 1957, has named **Louis H. Wilson,** secretary and director of information of the **National Plant Food Institute,** as chairman of the **National Participation Development Committee** for the event to be observed November 22-28.

* * *

Harry Caldwell, North Carolina State Grange master and secretary of the **National Grange** executive committee, is slowly recovering after a serious automobile accident last month, but will probably be in the hospital until September or October.

Bryce L. Rhodes, left, new general manager of the phosphate chemicals division of International Minerals and Chemical, Center, Dr. M. B. Gillis, director of research, and Dr. William C. Knopf, Jr., assistant director of research.

CHANGES

Russum

Blaw-Knox Company, chemical plants division, Pittsburgh, has announced the expansion and reorganization of its Midwest Headquarters at Chicago, Illinois, and the promotion of **Benjamin D. Russum** to manager of this operating unit and **Dr. Hal B. Coats,** assistant manager. This fully integrated organization renders complete engineering and construction services in many processing fields, including general chemicals, fertilizers, resins and plastics, petroleum, petrochemicals, nuclear energy, and food with particular emphasis on the fats and oils industry.

* * *

Brea Chemicals, Inc., operating in the petro-chemical field, and the **R. T. Collier Corporation,** operating in the carbon and allied fields, both subsidiaries of **Union Oil,** were merged last month into a new corporation to be known as the **Collier Carbon and Chemical Corporation** with headquarters at 714 West Olympic Boulevard, Los Angeles. **R. T. Collier,** as president, will be chief executive officer of the new corporation. For the past 11 years he has been president of the R. T. Collier Corporation. **Homer Reed** will be vice president of the new corporation. He has been president of Brea Chemicals, Inc. since it was organized in 1952.

* * *

A new sales development department has been set up by **Stauffer Chemical Company's** agricultural chemical division. The department, which is headed by **Francis E. Cook** as manager, will be responsible for promoting and developing sales of such newly developed agricultural chemicals as Captan, Vapam, Trithion and other compounds now emerging from Stauffer's research laboratories.

The department will be headquartered in New York and will report to Dan Keating, vice president and general manager of the agricultural chemical division.

* * *

St. Regis Paper Company's Kansas City, Missouri, sales office of its multiwall packaging division has moved to its new location at 4010 Washington, Kansas City 11, Missouri. In addition to its Kansas City sales office, St. Regis also has a multiwall bag plant in Kansas City.

* * *

California Spray-Chemical has acquired the greater part of the anhydrous ammonia distribution facilities of the **Agricultural Ammonia Service, Inc.,** of Santa Paula.

A. W. Mohr, president, stated that Calspray would take over the entire facilities and operations of Agri-Serv from the Lodi-Stockton area, south to the Kern county line. Agri-Serv, an authorized distributor of Ortho NH, since 1955, will continue to act in that capacity in Ventura County, Los Angeles County, and the southern part of Santa Barbara County.

The acquisition of the Agri-Serv facilities by Calspray will place under the familiar Ortho banner numerous storage tanks with a total bulk capacity of 200,000 gallons, 600 field tanks, and more than 400 applicator tanks and rigs.

As a result of the purchase of Agri-Serv, the **Ace Ammonia Company** of Bakersfield has been named distributor of Ortho anhydrous ammonia in Kern County and Tulare County south of Earlimart. The Ace Ammonia Company was formerly affiliated with and represented Agri-Serv in the application of Ortho Anhydrous Ammonia.

* * *

Fulton Bag & Cotton Mills has announced the sale of its Kansas City, Kansas textile bag factory to the **Pioneer Bag Company** of Kansas City.

* * *

Jason M. Eisas, vice president and general manager of Fulton's bag division, New Orleans, emphasized the Company will continue to serve its Mid-West textile bag customers without interruption from adjacent plants.

* * *

The Lummus Company, internationally known engineering and construction firm, has announced the sale of its **Heat Exchanger Manufacturing division,** with plant located at Honesdale, Penna., to **Yuba Consolidated Gold Fields,** effective last month.

J. F. Thornton, president of Lummus, announced that this move conforms with the company's recent decision to divest itself of its manufacturing divisions in order to concentrate on its main activities—engineering and construction. It is proposed to change the name of the parent company, as of July 31, 1957, to **Yuba Consolidated Indutries, Inc.,** with headquarters in San Francisco, plants in Benicia and Richmond, Calif., Buffalo, N. Y. and now Honesdale, Penna.

* * *

Virginia-Carolina Chemical Corp. has announced the closing of its sales office in Savannah, Ga.

At the same time the concern disclosed that plants at Augusta and Atlanta are also being closed. This tonnage will be supplied from the three remaining Georgia plants located at Savannah, Albany and Rome.

Four employes are involved in the closing of the sales office. **Paul Renfroe,** sales manager, is being transferred to a like position with V-C at Greensboro, N. C. **C. L. Lunsford,** veteran cashier, is being retired.

V-C officials said that sales operations for the entire state will be concentrated in Albany. Heretofore, sales offices have been located at Savannah, Atlanta and Albany.

With the closing of the Augusta plant, V-C has transferred **B. A. Blanton,** plant superintendent, to Savannah as assistant to **James T. Meadows,** plant superintendent there.

V-C News Receives First-Place Award

V-C News, publication of the Virginia-Carolina Chemical Co. here, has received a first place award in the publications contest of the Middle Atlantic Association of Industrial Editors.

Clifton Long is editor of the publication, and Mrs. Virginia Carter is managing editor. The publication's award was made in the category of magazines for employees in more than one location.

Associations

Potash Producers Leave NPFI

Major domestic potash producers maintaining membership in both the American Potash Institute and the National Plant Food Institute, resigned recently from the N.P.F.I. because of greatly increased and what they consider to be inequitable N.P.F.I. assessments to finance its expanded program of activities.

The potash producers pointed out in their statement that the proposed new program of the National Plant Food Institute is basically similar to activities conducted by the Potash Institute since its formation in 1935. During that time the Potash Institute has spent more than $10,000,000 in promoting balanced fertilization programs aimed at increasing the proper use of potash as well as other plant nutrients in the form of mixed fertilizers.

During the 22 years of A.P.I. activity the consumption of agricultural potash in this country has risen from 218,157 tons in 1935 to 2,103,127 tons in 1956. Nevertheless, the price of potash has not increased in the past 20 years, contrary to the general rise in most other materials.

Fred Coope, president of Potash Company of America and spokesman for the resigning member-companies said the move was taken because the proposed dues were "extremely inequitable . . . for the great majority of potash companies who have for years supported the American Potash Institute . . . for a program of research, education and promotion which benefits the entire fertilizer industry."

The potash companies affected were American Potash & Chemical Corporation, Duval Sulphur & Potash Company, National Potash Company, Potash Company of America, Southwest Potash Corporation, and United States Potash Division of United States Borax & Chemical Corporation. Only one major potash producer has not been a member of A.P.I.

"We were already deeply committed to the expense of the American Potash Institute," Mr. Coope said, "and we concluded we could not bear the additional burden of this N.P.F.I. program."

Despite their resignation, the potash manufacturers endorse the fundamentals and principles of the N.P.F.I. program. The companies offered to continue their present contributions to the N.P.F.I. even though they have resigned.

A representative of one of the resigning companies said the 1956-57 budget for Potash Institute was $611,000, while the total budget for N.P.F.I. was $530,845 for the same period. This is in spite of the fact, which many people do not realize, that the potash producers form a very minor segment of the fertilizer industry. In the N.P.F.I. 1956-57 budget, based on the same levy on net sales for all, potash products were less than seven percent of the total. Taking this situation into consideration, the disparity between Potash Institute member contributions and that of others to educational programs becomes highly inequitable. Financial support for the Potash Institute program has come from assessments of from one to two percent of each member-company's annual gross sales.

An important part of the A.P.I. program has been the financing of research projects in more than 40 different states and provinces in the United States and Canada to provide both general and regional information on correct use of potash and other fertilizer materials. In addition, the A.P.I. has conducted a widespread educational campaign through advertising, publicity and field representatives to further the program, and has had the continued and active cooperation of Federal and State Departments of Agriculture since its organization.

Regional representatives for the A.P.I. engaged in their field research programs include E. T. York in the Northeast Area; J. Fielding Reed, C. W. Summerour, N. D. Morgan and E. H. Bailey in the South; Werner L. Nelson, H. L. Garrard and G. A. Wickstrom in the Midwest; M. E. McCollam, Forest S. Fullmer and Grant Braun in the Pacific Coast Area, and R. P. Pennington in Canada. District offices are maintained in Atlanta, Georgia; San Jose, California; Lafayette, Indiana; Hamilton, Ontario, with National headquarters in Washington, D. C.

NPFI Appoints 5 To Study Dues

John A. Miller, president of the National Plant Food Institute, has announced the appointment of a 5-man committee "to evaluate the dues structure of the Institute to determine whether there are any inequities" and to report their findings to the Board of Directors at a meeting scheduled for October 30.

The Committee follows: William E. McGuirk, Jr., president, Davison Chemical Company, division of W. R. Grace & Co., Chairman; B. W. Bellinger, executive vice president, Tennessee Corporation; J. C. Crissey, division manager, G.L.F. Soil Building Service; Hugo Riemer, president, Nitrogen Division, Allied Chemical & Dye Corporation; and Richard C. Wells, president, National Potash Company.

The Committee will consider any differences in views regarding the dues structure as approved by the Board of Directors. Because of the importance of the study, an official report of findings will not be available until after the Board meeting is held.

4-H Representatives Also Industry Aid

Representatives of the fertilizer industry will soon be given an opportunity to help the 4-H movement on a nation-wide basis, according to two leaders of the fertilizer industry, John V. Collis, president of the Federal Chemical Company, Louisville, and R. E. Bennett, president, Farm Fertilizers, Inc., Omaha, Neb.

They will kick off a special fund raising program in behalf of the National 4-H Club Foundation on July 25. Collis, who has been a member of the Foundation's 4-H Builders' Council, will be assisted this year by Mr. Bennett, who has just joined the Council.

In a letter to members of the fertilizer industry, Collis and Bennett said, "We know you recognize both personally and from the standpoint of your company the value of the 4-H movement in the training of better citizens . . . Your company is likely supporting 4-H work locally. We, too, contribute our major support locally. At the same time, however, we recognize the significant contribution the National 4-H Club Foundation is making toward the improvement and expansion of the local program . . . We feel this program deserves additional support from our industry."

Otto Croy, USDA, presents to Louis H. Wilson, NPFA, a plaque "in appreciation of outstanding contributions to the development of the 4-H program."

The National 4-H Foundation is a non-profit, educational organization, established in 1948 to assist the Extension Service and the 4-H Club program in helping millions of boys and girls prepare themselves for happy, useful and well-adjusted living. The Foundation is currently carrying out a people-to-people exchange of rural young ambassadors between the United States and 50 countries of the free world through the International Farm Youth Exchange, developing a National 4-H Club Center near Washington, D. C., and providing consultant services to youth leaders in the area of human relations and citizenship improvement.

More than 2.2 million boys and girls are now members of the 4-H movement in the 48 states and territories. Their projects range from poultry to peanuts, from home management to the raising of corn. In 1956, 90,519 club members completed corn projects involving 244,367 acres; 30,917 completed potato projects involving 20,607 acres; and 30,053 completed cotton projects involving 66,781 acres.

Kansas Editor Gets NPFI Award

Lowell Brandner, Agricultural Editor, Kansas State College, was announced as the winner of the American Association of Agricultural College Editors-National Plant Food Institute "Agricultural Communications Awards" at a special dinner ceremony at Colorado State University.

Announcement of the award was made by Samuel H. Reck, Editor, Extension Service, College of Agriculture, Rutgers University, New Brunswick, N. J., President of AAACE, which held its 41st Annual Convention at Colorado State University. The award was accepted, on behalf of Mr. Brandner, by Lisle Longsdorf, Extension Editor, Kansas State College, Manhattan.

Louis H. Wilson, Secretary and Director of Information for the Institute, presented to Mr. Longsdorf, on behalf of Mr. Brandner, a scroll signed by the national judges, together with a check for $500 to be used for advanced professional training in agricultural communications.

NPFI's "Review" Honored

Plant Food Review, the National Plant Food Institute's quarterly magazine, received a first award in the annual Middle Atlantic Association of Industrial Editors' publications contest last month. The Review was entered in the division for "external" magazines.

Delbert L. Rucker, editor, accepted the award at ceremonies in the National Press Club where the association was holding its final meeting for the 1956-57 year.

Mr. Rucker also was elected president of MAAIE for the coming year and will hold this office until June, 1958. He served as vice president of the association prior to being elected president.

MAAIE is the affiliated regional association of the International Council of Industrial Editors.

New England Conference Sept. 25

The annual New England Fertilizer Conference, conducted under the auspices of the National Plant Food Institute, will be held at the Bald Peak Colony Club, Melvin Village, New Hampshire, on September 25, 1957, Dr. Russell Coleman, Executive Vice President of the Institute has announced.

The Conference which usually brings together representatives of the New England fertilizer industry and New England colleges of agriculture, will be open to members of the Institute and invited guests.

Kentucky Conference September 4

The annual Kentucky Fertilizer Conference is scheduled for 10:00 A.M. (CDT) September 4 at the Campbell House, Lexington. The program will feature talks by Experiment Station Personnel during the morning, a luncheon, and a visit to Agronomy Research Plots in the afternoon. All interested in the production and sale of fertilizer are welcome.

The Fertilizer Association Of India
Himayatnagar Road
Hyderabad 1 Deccan.
India

March 23, 1957

The Editor,
"Commercial Fertilizer & Plant Food Industry"
Dear Sirs,

While thanking you for the courtesy extended to the Fertilizer Association of India since its inception in May 1955, we are happy to inform you that during the past two years, our Association has grown both in strength and its usefulness.

We shall be happy to render any service you may need from us, as we are in direct touch with the Government of India and its various Committees through our Chairman, Mr. Rahimtula, who is representing the Association on the following Committees—

1. *Development Council for Heavy Chemicals and Fertilizers, Ministry of Commerce and Industries, Government of India;*
2. *Central Superphosphate Panel of the Ministry of Agriculture, Government of India;*
3. *Standing Committee of Experts on Manures and Fertilizers, Ministry of Food & Agriculture, Government of India;*
4. *Indian Standards Institution Committee on Heavy Chemicals;*
5. *Indian Chemical Manufacturers Association.*

Yours faithfully,
(Signed) M. S. Sitharamiah,
Secretary.

1. Palmer Townsend (left), Washington County Extension Agent at Hillsboro, Oregon, was in direct charge of the field day.
2. A crowd of more than 500 showed up for the Hillsboro field day.
3. Visitors saw much to interest them; many were observed taking notes.
4. Much attention was centered on the Lennox Blatchford dairy herd.

500 AT OREGON GRASS MEET

Over five hundred producers, primary producers of fertilizer materials, dealers and manufacturers attended the field day held on the Oregon Grasslands Farm Demonstration Project, sponsored by the Pacific Northwest Plant Food Association, near Hillsboro, Oregon.

A steady stream of busses moved all day long from the Fair Grounds at Hillsboro to the farm project, about five miles from town. An explanation of the project, its aims and purposes, was given by guides on the busses and groups were met at the farm by a guide. The guide then took the visitors to seven stations on the farm, where county agents and technical men from Oregon state college explained the crops planted on the fields, types of fertilizer uses, soil testing, management practices, etc. Luncheon was served to all the visitors.

The farm—operated by Lennox Blatchford—is a typical family sized dairy farm. The main object of the demonstration farm is to show the value of increased forage production and the efficient use of this increased forage production for maximum profits. In other words, more milk in the cow for less money. This is being based on:

1. Fertilizer application based on soil tests.

2. Improved pasture management —the use of short rotation grazing and daily ration grazing where possible. Maximum use of extra summer forage through silage.

3. Planting pasture crop varieties best suited to the area.

4. More efficient use of irrigation.

5. Effective herd management, production testing and culling. The project is set up on a three year basis. The first year program was financed entirely by the Pacific Northwest Plant Food Association. This year about 75 per cent of the cost was financed by fertilizer dealers and manufacturers in the area.

The fertilizer program on the farm has been based on the results of soil tests. College specialists assisted in planning the crop variety program. Moisture stakes for telling when to irrigate were installed. The soil conservation service provided soil survey information; the A.S.C. office provided practical assistance for seeding and liming. The whole operation was supervised by a technical committee.

Fertilizer Program

There were eight separate plots on the farm. Nitrogen was applied on five of the plots; phosphorus was applied on one field; potash on 3 fields; boron on 6 of the fields; sulphur on 5, and lime on 6 of the fields. The farm consists of 83 acres total. The home farm is 56 acres, 43 crop land. Of the 27 additional acres, 22 are in cultivation. Fifty acres are irrigated.

The Demonstration Farm Program is the third sponsored by the Pacific Northwest Plant Food Association. The Washington project is completed, the Idaho project is in its last year.

The programs have been under the direct supervision of the Soil Improvement Committee of the Association, of which Grant Braun, of the American Potash Institute is the Chairman. The Washington project, first started, was under the guidance of George Wickstrom, then Chairman, and also with the American Potash Institute.

Palmer Torvend, Washington County Extension Agent at Hillsboro, has been overseer of the Oregon project, under supervision of the Technical Committee headed by Dr. Thomas Jackson, Oregon State College.

These farm projects have one distinction—they are not experimental plots and also are considered to be the only kind sponsored by the Fertilizer Industry any place in the United States.

200 at Pacific Regional Conference

Over 200 were in attendance at the Eighth Regional Fertilizer Conference at the Benson Hotel, Portland, Oregon on June 26-27-28. This conference is sponsored annually by the Soil Improvement Committee of the Pacific Northwest Plant Food Association in cooperation with Oregon State College, Washington State College and the University of Idaho.

Morning sessions were devoted to technical papers and discussion on Wednesday, Thursday and Friday. Wednesday afternoon, over 100 were taken by bus to the Clackamas County Experiment Station and then to the experiment station at Vancouver, Washington.

Thursday afternoon about the same number were taken to the Oregon Grasslands Demonstration Project, sponsored by the Association.

Annual banquet and entertainment were held Thursday night.

Pocatello, Idaho was selected as next year's site, with the date not set but it will be held either the latter part of June or fore part of July.

SAVE TOPSOIL

The Men's Horticultural Society of Greater Cincinnati has come out firmly against the practice of digging basements, and pouring subsoil all over good topsoil. Your editor has for years cringed, watching this going on.

Fifties? . . . . . Eighties? . . . . . Hundreds?

NEW ST. REGIS 185-AS BAGGING SCALE BRINGS YOU 5 BIG BENEFITS

HIGH PRODUCTION

20-30 fifty lb. charges a minute
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Single bucket design means only one scale has to be adjusted when analysis changes are made. It also permits quick cleanout from the single bin.

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Only 8 foot 4⅝ inch headroom is required, measured from top of sewing conveyor to belt feeder inlet. This means minimum installation expense.

The 185-AS scale is typical of the packaging improvements St. Regis has developed to help the fertilizer industry achieve greater economy, efficiency and speed. Let us tell you more about St. Regis service to packers of both open mouth and valve bags, and how our complete Packaging Service can help you. Send in the coupon today.

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Please send me information about the 185-AS Scale, and St. Regis complete Packaging Service.

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CITY..... STATE.....

USDA Seeks Cheaper Pasture Establishment

Agricultural engineers, crops specialists, and soil management researchers of USDA have begun a three-pronged attack on the high cost of pasture establishment.

Experiments show that it is possible to establish good stands with one-half the seed and one-third the fertilizer commonly regarded as necessary with conventional seeding methods. Fertilizing at a lower rate, with proper placement, helped to hold back weeds, which are a major problem in pasture establishment.

This research is especially important to farmers participating in the Conservation Reserve of the Soil Bank Program. Under the new law, farmers receive payments amounting to about 80 percent of the cost of establishing a cover the first year. Should their first seeding fail, they must stand the full cost of establishing pasture crops in subsequent years. It now takes, on the average, two years to establish a seeding.

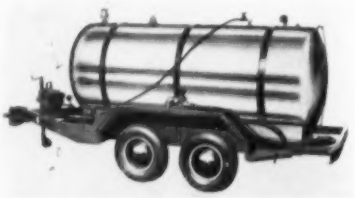
Ga. PFES Pasture Awards Made at Summer Meeting Series

Georgia Plant Food Educational Society held its summer series of meetings early in July to honor winners in the Grazing System and Feed Production contest sponsored jointly by the Society and the Georgia Agricultural Extension Service.

Meetings were conducted in each of the four districts of the state. The Northeast district meeting led off at Lexington July 1; the Northwest district assembly was at Covington July 9. July 11 was the date of the Southwest district gathering at Thomasville, and the Southeast district meeting at Statesboro July 12 ended the series.

Format of the program at each of the four sessions was identical, with a forenoon visit to a nearby farm of one of the award winners followed by luncheon and a presentation of certificates to the winners in that district. Practices used by some of the winners were discussed at the luncheons, and observations were made during the farm tours that preceded.

W. A. Sutton, Ga. AES director, presented the certificates at those sessions he was able to attend, and was represented by C. C. Murray, dean of the College of Agriculture, when he was unable to be present.



General Metals, Incorporated, Greensboro, North Carolina, pioneer manufacturers of equipment for nitrogen solutions and liquid fertilizers, are now in production on this new trailer-mounted "Nurse Tank" transport, with many new features and advantages over the wagon-type transport. For literature, prices and other information on the General Metals Trailer-Mounted "Nurse Tank" Transports, write for bulletin No. 40255 to General Metals, Incorporated, 858 Goldsboro Street, Greensboro, North Carolina.

MARKETS

ORGANICS: The market on organic ammoniates for fertilizer use is quite strong with one of the major producers of Leather Nitrogenous Tankage completely sold out for 1957 and other producers in similar well-sold positions. Price for January/forward of one of the major producers is $3.25 per unit of Ammonia, bulk, f.o.b. midwestern production point.

SEWAGE SLUDGE: One major producer is contracting for the new season at $2.60 per unit of Ammonia and 50 cents per unit of APA f.o.b. midwestern producing point for July through September shipment, indicating $3.10 per unit of Ammonia and 50 cents per unit of APA for October/forward shipment.

CASTOR POMACE: There is no current domestic production in the east and supplies are not expected to be available until sometime in the Fall. Last price paid was $45.50 per ton in bags f.o.b. Northeastern shipping point. Limited supplies of imported material have been offered at prices around $50.00 to $60.00 per ton c.i.f. Atlantic Coast ports.

DRIED BLOOD: Unground, sacked Blood is indicated at Chicago around $6.00 to $6.25 per unit of Ammonia and around $5.00 at the New York area. The market is firm, tending upward.

POTASH: This market continues firm at previously quoted prices, which are slightly less than those prevailing during the past season. Shipments are primarily against contract committments.

GROUND COTTON BUR ASH: This form of Potash, primarily in the form of Carbonate of Potash, continues to move in good volume primarily for specialty use and continues to test around 38/42% K_2O.

SUPERPHOSPHATE: At this time of year stocks of Superphosphate are being kept at low levels in most areas and prices for the new season are advancing slightly over last season. Superphosphate at Charleston is reported at 76 cents to 74 cents depending on the analysis, and at Savannah around 74 cents to 75 cents per unit of APA in bulk.

PHOSPHATE ROCK: Prices continue steady and stocks in good shape. Movement is entirely seasonal.

CALCIUM AMMONIUM NITRATE: Demand for this form of Nitrogen which is primarily used for direct application, is practically over for season just ending. No price for the new season has yet been announced.

AMMONIUM NITRATE: Demand for this material, which is largely used for direct application purposes, is relatively light at present, but prices for the new season beginning July 1, 1957 are $68.00 per ton f.o.b. works, in bags, subject to seasonal discounts July through September $4.00 per ton, October through December $2.00 per ton. This represents an advance of $4.00 per ton in the basic price over previous season.

GENERAL: Movement of mixed fertilizers is practically over in the southeast and fertilizer manufacturers are primarily concerned with contracting for raw materials for the new season. Cost of a number of mineral nitrogen products for the new season will be greater than for the past season. Interest in Organic ammoniates is strong and supplies are being rapidly taken up. Increased cost of labor and production indicate that cost of mixed fertilizers should be slightly higher for the new season.

INDUSTRY CALENDAR

Date	Organization	Place	City
Sept. 24-25	New England Fert. Conf.	Bald Peak Club	Mil'vn Vil'ge, N.H.
Oct. 3-5	Pacific N.W. Plant Food		Sun Valley, Ida.
Oct. 17	Chem. Control Procedures	Shoreham Hotel	Washington, D.C.
Oct. 17-18	Control Officials Assn.	Shoreham Hotel	Washington, D.C.
Oct. 21-22	Fertilizer Safety Section	La Salle Hotel	Chicago, Ill.
Oct. 31	Southern Fert. Conf.	Dinkler Plaza	Atlanta, Ga.
Nov. 1	Sou. Soil Fertility Conf.	Dinkler Plaza	Atlanta, Ga.
Nov. 3-5	Calif. Fert. Assn.	St. Francis Hotel	San Francisco
Nov. 6-8	Fert. Indus. Round Table	Sheraton Park	Washington, D.C.
Nov. 17-19	Nat'l Fert. Solutions Assn.	Netherland-Hilton	Cincinnati, Ohio
Dec. 11-13	Ag. Ammonia Inst.	Marion Hotel	Little Rock, Ark.
	1958		
Jan. 7-8	Texas Fert. Conf.	Memorial Center	College Station
Feb. 13-14	MidWest Soil Impr.	Edgewater Beach	Chicago, Ill.

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	June		May		Jan.-Mar. Qtr.		July-December		January-June		YEAR (July-June)	
STATE	1957	1956	1957	1956	1957	1956	1956	1955	1956	1955	1955-56	1954-55
Alabama		55,202[1]	162,101	155,578	291,118	347,956	174,707	165,867	813,104	846,735	1,029,030	1,114,238
Arkansas		25,691[1]	52,965	40,577	120,899	141,981	59,915	60,299	299,172	270,894	359,471	330,781
Georgia	136,249	147,230	301,056	280,937	221,375	216,862	253,559	250,968	993,954	1,047,875	1,244,422	1,273,445
Kentucky		23,459[1]		144,087[1]	173,850	168,371	90,284	91,478	441,481	431,024	529,600	522,410
Louisiana	25,940	19,883	42,699	33,722	82,709	93,469	71,129	59,345	214,343	232,781	273,688	310,848
Missouri		23,882[1]	129,714	85,055	219,689	235,254	331,343	356,241	450,102	414,503	804,441	682,690
N. Carolina		88,223[1]	211,294	235,304	534,774	581,897	216,234	225,182	1,424,267	1,566,158	1,649,449	1,830,633
Oklahoma		6,086[1]	8,484	13,915	27,868	31,884	54,509	69,542	65,854	63,799	135,396	122,204
S. Carolina	29,475	33,262	72,526	88,324	393,741	452,619	122,929	119,947	743,670	796,111	863,617	928,715
Tennessee		108,890[1]	137,378	121,941	48,649	50,736	165,796	154,260	378,676	355,966	515,551	523,349
Texas		49,681[1]	60,589	65,024	205,547	180,802	202,406	193,704	377,805	375,176	566,399	588,062
California		(reports compiled quarterly)			264,270	280,853	412,747	361,615	639,377	603,657	1,001,554	922,127
Virginia		(reports compiled quarterly)			277,124	273,642	154,075	162,709	599,111	636,585	761,820	795,770
Indiana			(reports compiled semi-annually)				305,939	255,131	807,918	873,966	1,063,049	1,158,960
Iowa			(reports compiled semi-annually)				85,147	130,000	315,329[1]		445,329[1]	
Michigan			(reports compiled semi-annually)						443,908[1]			
New Hampshire			(reports compiled semi-annually)				3,253[1]		13,168[1]			
Washington			(reports compiled semi-annually)				55,709	48,749	103,885	124,186	152,674	182,348
Connecticut			(report issued annually)								76,660	84,494
Oregon			(report issued annually)				124,294[1]		241,742[1]			
TOTAL	191,664	200,375	1,178,806	1,120,377	2,861,613	3,056,326	2,756,428	2,705,037	8,352,719	8,639,506	11,026,821	11,371,074

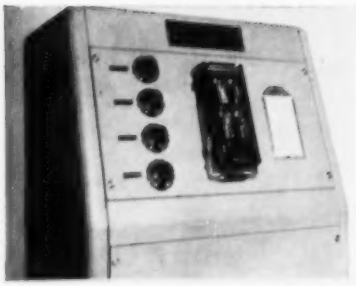
(not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.

Richardson's New Formula Board

A new formula board resembling a simple cribbage board has been introduced by Richardson Scale Co. as a means of achieving automation in the program control of batching operations, the company has announced.

When the formula board is used for pre-setting weight data in an automatic proportioning panel, it eliminates the need for manual weight settings and the possibility of human error in electronically controlled operations involving the proportioning of bulk materials. Simple and compact in design, the combination board and panel are used as components in Richardson's Select-O-Weigh system, which provides automatic control over storing, feeding, conveying, weighing, mixing and discharging of bulk ingredients. Typical applications of the system include the formulation of a variety of mixes for chemical processing operations.

The formula board is especially useful for processors using many mixing formulas with frequent changeover. The interruptions involved in changing from one formula board and replacing to another are eliminated by simply removing one formula board and replacing it with another of pre-determined settings. This procedure results in a substantial speed-up of operations, and also makes for greater accuracy since control is no longer subject to error at the hands of an operator.



Richardson Formula Board for the complete automation of a proportioning operation is shown in position in a formulation panel. The compensation dials at left are used to compensate for materials suspended in air at time of cutoff, and table at right shows the prescribed formulas for various mixes.

The operator need only insert formula board into position and press a starter button. The rest is completely automatic, and the proportioning and mixing operations are continued without interruption.

The formula board system is especially rugged and durable and can be used in any field of operation despite dusty and dirty plant conditions, according to Richardson Co.

There is no limit to the amount of ingredients or functions that can be controlled with the Richardson Formula Board.

Velsicol Offering Gibberrellins

J. F. Kirk, vice-president, Velsicol Chemical Corporation, has announced that the company has added Gibberellin to its line of agricultural chemicals. Velsicol Gibberellins are now available in commercial quantities and will be sold to formulators for conversion into packaged products for agricultural and home use.

Velsicol is cooperating with Federal and State Eperiment Stations in the economic evaluation of Gibberellin-induced response on major crops.

For more information about Velsicol Gibberellins, write to Velsicol Chemical Corporation, 330 E. Grand Ave., Chicago 11, Illinois.

New Promotional Materials From Velsicol

Velsicol Chemical Corp. has announced availability of a considerable number of new educational and sales promotion pieces for use by the trade to promote agricultural insecticide sales.

Included are three new streamers featuring Heptachlor. One (#511-13) covers boll weevils; another (#511-5) deals with thrips and flea-

(Not yet reported) - Not compiled * Omitted from column total to allow comparison with some period of current year.

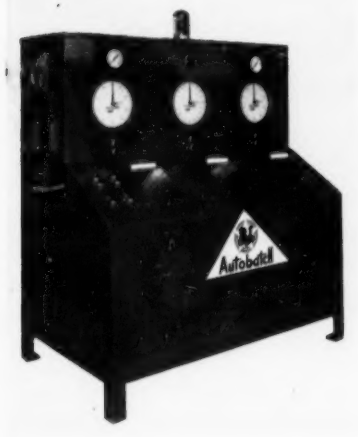
hoppers, while a third (#511-4) mentions all three of these prominent cotton insects. The assortment provides a suitable streamer to meet local infestation conditions. Also available is a twelve page, 4-color booklet (#503-4) on general cotton insect control and a revised version of a folder (#503-16) featuring early season insect control.

Two new folders on Endrin have been introduced. The leaflet (#508-2) on tobacco insect control features illustrations and descriptions of hornworms, budworms, flea beetles, and grasshoppers. The second folder (#508-3) is for use in promoting Endrin to control cotton insects. Accurate life-like illustrations of a boll weevil and a boll worm appear on the cover.

A complete new line of Heptachlor grasshopper materials are now available including a window streamer (#511-3) and an educational folder (#503-10). Also ready for immediate use are dealer ad mats, editorial mats and suggested radio scripts.

A new streamer (#511-4) and educational booklet (#503-3) tell how to control both soil and foliage insects. The book is well illustrated and points out the Heptachlor formulations to be used.

For free copies of any of the new promotion materials, write to: Velsicol Chemical Corp., 330 East Grand Ave., Chicago 11, Ill.



This new, completely automatic control unit for batch-type processing of neutral solution liquid fertilizers has been introduced by Barnard & Leas. Complete information on the "B&L Autobatch" and neutral solution liquid fertilizer processing is available by writing chemical plants division, Barnard & Leas Mfg. Co., Inc., Cedar Rapids, Iowa.

Monsanto Electronic Computer Brings Better Service

By combining the mathematical speed of an electronic computer and the closely controlled production of modern engineering research facilities, Monsanto Chemical Company can offer the fertilizer manufacturing industry technical service never before available, says Tom K. Smith Jr., director of marketing for the company's inorganic chemicals division.

OBITUARIES

Claude K. Boettcher, 81, board chairman Potash Co. of America, at Denver.

W. Dewey Cooke, vice-president and treasurer, Southern Fertilizer & Chemical Co., Savannah, died June 29.

Charles Ellis, 90, founder of the Mutual Fertilizer Co. died July 14 at his home in Savannah, Ga.

William A. Pease, for 21 years with Wilbur Ellis Co., Seattle, died recently of a heart attack.

RESEARCH RESULTS & REPORTS

Dreamstuff has a way of turning into stuff you can buy in every store. So we read with earnest attention the many dreams that are reported here and there. The most recent, and one of the most interesting, agriculturally speaking, that we have ever encountered, is that in the not too distant future they will be able to make weeds germinate out of season, so they can be killed off without disturbing a crop.

The same source predicts that wanted seeds will germinate early and be frost resistant; grass that will stay green; plants that won't die for lack of water when you go on a vacation.

It can be a pretty wonderful world; in fact, it is!

O

Lady got her picture in the paper recently because she bought 30,000 lady bugs, which she turns loose a few at a time to get after the aphids on her roses. But where, please, do you go to buy lady bugs—especially 30,000? And how does she keep her reserve while they await their turn to march on the aphids?

O

The gibberellin publicity continues unabated, but meanwhile science has been peeking beneath the skins and shells and pods and fine gibberellin-like substances in such innocent seeming places as the seeds and fruits of seven families of flowering plants . . . and gibberellin-like responses, too when the new products are used.

O

A gent far from the field of agriculture, and in a field where research is a lot less important—at least it looks that way from where we sit—made a talk the other day and said this: "You have to go in for research and development in a big way, these days, just to stay even with your competitors." What's that line from Alice in the Looking-glass: "Here," said the Dutchess, "it takes all the running you can do to stay in the same place." The gent in question is president of Eversharp, Inc., who make pencils, pens and such.

O

Minor elements and their interrelationship came in for a thorough overhauling recently, when—for the first time—a symposium was held in Florida, sponsored by International Minerals & Chemical. Some big names came, talked, and went away to dig some more into the subject. It is a big one, a vital one, and one on which not nearly enough research has been done.

O

USDA says the wider use of thinning sprays this year will result in better size and better looking fruit. The developing use of these sprays will, they believe, help level off the fruit crop pattern, by eliminating "on" and "off" years. They warn, however, that plenty of research is still needed on this subject.

CLASSIFIED ADVERTISING

HELP WANTED

Production Superintendent for Granular Fertilizer Plant. We want experienced Production Superintendent for 50,000 ton yearly capacity granular plant southwestern area. Write, giving full details of educational background, complete history of employment and job experience, family and references, Box #9, c/o Commercial Fertilizer, 75 - 3rd St., N. W. Atlanta, Ga.

WANTED: Combination lead burner and sulphuric acid man for chamber type plant. Also, shipping foreman. Write, giving full details of experience, educational background, age, salary expected, and references. Box #21, c/o Commercial Fertilizer, 75 - 3rd St., N.W. Atlanta 8, Ga.

PRODUCTION SUPERVISOR. Granular Fertilizer Plant. Permanent position in expanding facility. Midwest area. Send brief resume of education and experience. Address Box 20, c/o Commercial Fertilizer, 75 - 3rd St., N.W., Atlanta 8, Ga.

SITUATIONS WANTED

WANTED: Position as Manager or Superintendent of fertilizer factory. Over 20 years experience, thoroughly experienced in the manufacture of sulphuric acid (chamber type plant), superphosphate and mixed fertilizers. Have managed both union and non-union labor, both water front and inland factories. Can furnish excellent nationally known references. Presently employed, good reason for change. Box # 7, c/o Commercial Fertilizer, 75 - 3rd St., N. W. Atlanta, Ga.

WANTED: Position as plant superintendent, experienced in transportation and complete fertilizer plants. For reference and business resume, write Box 19, c/o Commercial Fertilizer, 75 - 3rd St., N. W. Atlanta 8, Ga.

WANTED TO BUY

WANTED: Used Shipping Unit in good condition, elevator, screen, clod breaker, bagging hopper, capacity about 12 tons per hour. Must be priced right. Epting Distributing Co. Leesville, S. C.

EQUIPMENT FOR SALE

FOR SALE: Rotary Dryers 5' x 30', 5' x 40', 4'6" x 50', 5' x 67', 6' x 60', 9' x 80'. (1) Pressure Tank 13,000 gal. 220#. Also Mixers, Storage Tanks, Screens, Elevators. Send us your inquiries. Brill Equipment Company, 2402 Third Ave., New York 51, N. Y.

FOR SALE: Louisville 8 Roll 36" Dewatering Presses; J. B. Model W. Hammer Mill; Ribbon Mixers 336 and 56 cu. ft.; Gemco 6' dia. Conical Blender; Rotary Steam Tube Dryers 6' x 40', 6' x 30', 4' x 30'. Steel & Aluminum Tanks 400 to 23,000 gal. Also, Pulverizers, Conveyors, etc. Perry Equipment Corp., 1426 N. 6th St., Philadelphia 22, Pa.

For Sale

Complete set of equipment for manufacturing and bagging fertilizer. Including 1 ton Stedman mixing unit, 400' 20" belt conveyor, 2 Hough payloaders, payloader scales, bagger, sewing machine, conveyors to loading dock, etc. All equipment is now in operation and is standard in every respect—not "Rube-Goldberg." Many more items too numerous to mention. All for $12,000. Will finance. Box 5, c/o Commercial Fertilizer, 75-3rd St. N. W. Atlanta, Ga.

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FOR PROMPT DELIVERY

1 Modified BROADFIELD SUPERPHOSPHATE Unit—capacity 30 tons per hour.

2 STURTEVANT Mixing Machines (one with bagging hopper), 2-ton drum, with Nitrogen Solution equipment—capacity 60 tons per hour.

Large stock of spare parts for fertilizer Plant. New parts 20% discount, freight paid to your plant. Write for catalogue.

Several late model Payloaders.

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TELEPHONE 2-7016,
CHARLESTON, S. C.

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Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for Florida Hard Rock Phosphate Export Association. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemist for National Cottonseed Products Association.

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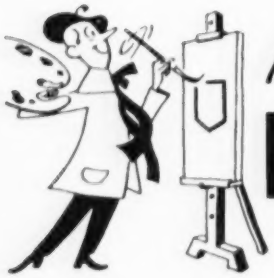

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TWX No. — WA-331

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